RAILROAD GAZETTE

FRIDAY, JULY 24.

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Contributions.

Compound Engines That Wont Go.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I was much interested in the letter of "Compound" relating his experience with a balky compound locomotive, especially as I recently observed a similar balk.

This occurred with a 24-in. stroke, two-cylinder compound, without an intercepting valve, attached to a heavy freight train.

The low-pressure crank, instead of being on the quarter, where steam would be admitted to the low-pressure cylinder, was just below the back dead centre, the high-pressure piston having moved through 10½ in. of its forward stroke when the engine had stopped just before balking. In this position there should have been no steam admitted into the cylinders, except at the back end of the high-pressure cylinder. On opening the throttle the engine moved ahead a few inches till the low-pressure crank all but reached the back dead centre, and then sagged back an inch or two and came to rest. Nor would she budge even when the throttle was wide open.

Indicator cards showed a pressure of 160 lbs. on the back of the high-pressure piston, 78 lbs. on the front of the high-pressure piston, 70 lbs. on the back of the low-pressure piston, and no pressure on the front of the low-pressure piston. Indicator cards taken at the expiration of several minutes showed practically the same pressure.

The application of a simple remedy started the train without backing the engine. Will some one suggest the reason for the balk to which I refer, and name the remedy?

COMPOUND, JUNIOR.

Radius Bars for Mogul Engines.

Norfolk & Western Railroad Co.,
ROANOKE, Va., July 17, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have your letter of July 8 about radius bars on front trucks of mogul and consolidation engines.

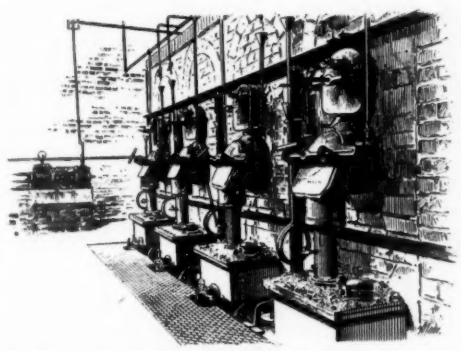
I made some tests and careful observations in this line some time ago with a view of finding out what was the proper length of radius bar for the wheel base of engines that we were using, with the curvatures which are usual on our lines. With the first consolidation engines we bought, the flanges of both front trucks and front driving wheels began to sharpen very fast. It was found that the front-truck wheel was cutting on the inside of the curve and the front driving wheel binding hard against the outside rail. It was no ordinary grinding, either, as the noise and wear were very great.

The radius bar was found to be too short, which threw the truck too much over to the inside and caused it to crowd the front driving wheel against the outside of the curve. We then lengthened the radius bars on a number of engines, inch by inch, until we reached a length with which the truck wheels were binding hard against the outside rail all the time, and the front driving wheel was not doing its share of work. We then retreated from this position until we arrived at a length of radius bar which gave the truck the majority of the work to do, the driving wheel at the same time doing a legitimate portion of the guiding of the engine; but yet with neither wheel was the side pressure so great that the flanges would not occasionally glance away from the rails and run back again.

The wear on the flanges is not unusual now, and we have made all our radius bars since then of the length proportionate to the wheel base and curvature, as determined by these experiments. By recent checking up I find that this length agrees very closely with that which would have been obtained by the usual formulas, if we take the average curvature of the main line as the curvature to be considered when making the calculations.

We have had a varied experience with swing links on these trucks. They have been neglected at times until they were entirely inoperative, and the engines have curved, apparently, just as well without them as with them. I am not prepared to say that, when maintained in perfect good order and properly designed, the pivots on the truck placed fairly close together and those on the swing centre carrying the engine spread further apart, the engine will not ride easier through the curves; but the average swing hanger and pin is made too light. It bends and gives way and lets the truck saddle down until it bears on the frames.

I know of a large number of engines that have large swing centres blocked purposely so as to convert them into rigid-truck engines; and, while they hit the curves harder when entering at high speed than when the



Pintsch Gas Works—Retorts.

swing motion was not used, after some months' observation there were no noticeably bad results from this, either on the engine or on the track.

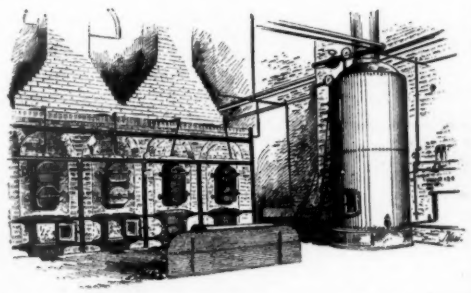
R. P. C. SANDERSON,
Division Superintendent of Motive Power.

[We wrote to Mr. Sanderson after learning that he had personally watched the action, on curves, of mogul engines with different lengths of radius bars, and under actual running conditions. It will be observed that the above evidence, secured by Mr. Sanderson while seated on the front end of an engine, agrees exactly with the conclusions we have heretofore reached; so that we may again emphasize the conclusion that the correct length of a radius bar is the true geometrical length.—EDITOR RAILROAD GAZETTE.]

Excursion Fares.

TO THE EDITOR OF THE RAILROAD GAZETTE:

What a lot of things there are in railroading which can stand an unending amount of investigation and discussion! One of these is the question, "What justifies a reduction from the regular passenger fare?" This was brought forcibly to my attention by reading some correspondence between General Passenger Agent Whitney, of the Great Northern, and Chairman Finley, of the Western Passenger Association. Mr. Whitney, in view



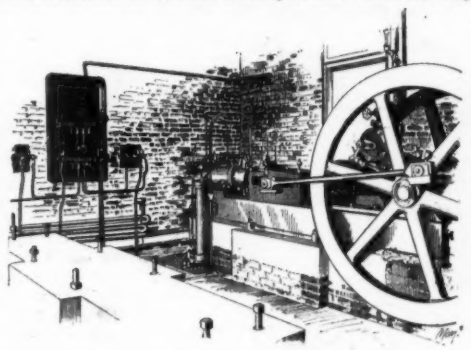
Pintsch Gas Works—Back Ends of Retorts.

of the enormous crop prospects in the Northwest, had asked the Chicago-St. Paul lines for a reduction in harvest tickets so that the imperative need of men in the wheat country could be met. To this the Association made no reply. Shortly afterward was announced a prize fight between two pugilists at St. Paul, whereupon the Chicago-St. Paul roads offered reduced rates to those wishing to see the fight. Mr. Whitney now publishes a letter in which he says: "The farmers of the Northwest have got the biggest fight on hand that they have had for the last seven years, and they are likely to be knocked out in three rounds (Marquis of Queensberry rules) unless they obtain help. It seems strange that a prize fight should take precedence in your association, and that a reduction in rates for the latter can easily be obtained, while a request in behalf of the farmers is postponed and delayed."

It does look odd, doesn't it? And it is no answer to say that Mr. Whitney is advertising himself and his road by his letter—"playing to the farmers," as the theatrical phrase would put it. A harvest-rate reduction would no doubt open the door to the gravest abuses, since everybody could take advantage of it and for a long period. And yet it must be equally true that a prize-fight reduction is open to the objection that others than "toughs" could travel on the low tickets, though not for so long a time. Yet if both reductions would be abused by regular travelers, why should we have one and not another? Besides all that, the sentiment of the community counts for something even as a matter of business, and that sentiment is not turned in favor of the railroads by the procedure just noted.

What principle is at the basis of rate reductions? Excursion fares are increasing all over the country, and doubtless each year a larger and larger proportion of our passenger traffic is made up of travelers carried at rates lower than schedule prices. I, for one, think that progress lies in just that direction, in spite of mistakes. If, for example, we give excursion rates and excursion trains perhaps, from any point to Niagara Falls, we no doubt carry for the whole or part of the distance some passengers who would otherwise have paid the regular fare; that is, excursion tickets are "scalped." But if, on the other hand, we greatly increase our gross ticket revenue either at no additional expense or at the cost of the movement expenses of the extra excursion train (say, 50 cents a train mile), we are undoubted gainers. Excursion fares must be put low enough to fill a long train if possible, but no lower than will do this and give the largest amount of gross returns from the whole train. If a passenger agent cannot figure this out he does not know his business thoroughly. The late Henry Monett always claimed that it was true as a broad principle that cheap excursions did not take much traffic from the regular trains. He certainly made a great success of excursions on the West Shore when it was first opened, though of course the circumstances of that road—new and without any following—made the experiment perforce successful.

What limit can be put to excursions? I have before me as I write a letter addressed to a prominent mercantile trade paper in New York City by an enterprising retail merchant in western Pennsylvania. He asks why



Pintsch Gas Works—Compressor.

excursion rates to New York and return cannot be made by the railroads so that country merchants and their families can be induced to make trips to the metropolis. Nothing of the kind has, to my knowledge, been tried. Could it be done with profit to the trunk lines? I ask the question without venturing an answer, leaving that to others. But I would like to see the question fairly discussed. I believe for myself—to go back to the general subject—that our railroads could find some way to encourage cheap traveling, without drawing too much away from their regular traffic, but I am not quite sure of the best way to accomplish it. Perhaps experiment could alone decide. Low fares might be offered on slow trains, such, perhaps, as do not now run full with local passengers. Any plan might be tried which made a sharp severance between high and low fares. Special excursion trains to special places we now have, though these were at first denounced as destructive to the regular travel. We now know that most of the special excursion travel is independent of the regular traffic. Who will give a clear and concise statement of the principle underlying all this?

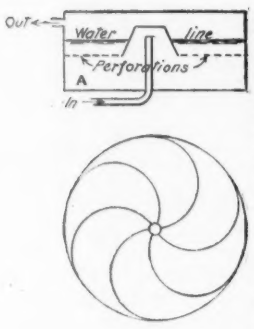
ARGUS.

Pintsch Gas on the Chicago & Northwestern.

The plant recently put up by the Chicago & Northwestern for the purpose of generating and compressing gas for lighting its coaches and sleepers by the Pintsch system is admirably situated a little over a mile west of the main passenger station at Chicago, between the C. & N. W. tracks and those of the Chicago, Milwaukee & St. Paul and adjoining the coach yard, the ground occupied being heretofore unused space. The building itself is very well constructed and is of brick and iron, and comprises a retort and boiler room, compressor room and purifying room, together with a tank shed at the west side.

The furnaces for vaporizing the crude petroleum are four in number and ranged in a row, the heat being generated from anthracite coal. The retorts are cast-iron drums about 6 ft. in length and 10 in. in diameter, and are double-barreled (one above the other), sufficient space being left between them for a separating course of firebrick. The crude oil on entering the upper retort from the back spreads itself over a pan extending midway through its length, from which it is evaporated by the intense heat surrounding the retort. This gas immediately passes down into and back through the lower retort, from which it goes out through a simply

constructed water trap into two upright receivers, where the tar products are arrested and sink to the bottom and are tapped off through a small pipe into a well. After this the gas is further relieved of foreign matter by rising through a flat circular drum partially filled with water, shaped like the sketch. In the lower part marked "A," extending from the centre to the sides, is a spiral arrangement of sheets as shown. These reach down from the perforated plate and are the means of dividing the escaping gas and more perfectly clearing it of suspended impurities. It then enters the lime boxes, of which there are two sets, with shut-off valves so that either may be used at a time, and by which the sulphur is removed. Thence it passes through the meter into the supply reservior, this latter being a substantial sheet-iron tank of the type generally in use, setting down into a well lined with brick and balanced over light posts on four sides.



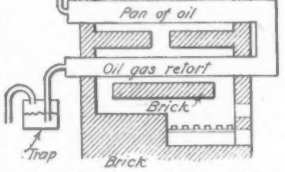
The compressor draws the gas from the reservoir through a freezer where the aqueous vapor that may have become mixed with the gas during storage is condensed (and drawn off). It is then forced into steel-plate cylinders 20 ft. long and 4 ft. diameter under a maximum pressure of some 15 atmospheres. These storage tanks are closed at one end, having a manhole at the other, and are built up by sections, the several parts being welded together so nicely that it is at times difficult to detect the exact line where the two sections join.

The arrangement of the piping and valves in the compressor room by which the gas is let into the storage tanks and thence to the yard mains is very ingenious. All the valves are double (a stop valve and a check valve) so that should the seat of either need regrinding, the other may be closed and the repairs made without first emptying the tank. Through the head of each tank there passes, besides the charging pipe, a small pipe running from close to the bottom of the tank to what is termed the hydrogen pot. This collects all the "hydrogen," so called, or lignified gas, condensed by reason of the high pressure and which occurs in small quantities only. The supply pipes around the yards are ¾ inch. The boiler used for the compressor is vertical and has a small Worthington feed pump attached, another pump of the same make being used for pumping the tar.

The petroleum is received in bulk and kept in vats sunk under ground in the yards, from which it is raised by a small Wells pump to a supply tank over the generating retorts. The burning gases from the grates under the retorts pass up near the ends of the lower drums and in to the centre, doubling back toward the ends under and around the upper drum and finally up and into the stack, each chimney answering for two retorts. The pressure of the gas in the drums is equal to that of about five inches of water, and the gas is prevented from backing out through the feed pipe by keeping the latter constantly filled several inches above its entrance into the drum, this amount being regulated by means of a small drip valve just above the feed funnel.

As will be seen from the outline sketch in the next column the heating gases are so distributed as to entirely surround both upper and lower retort and on account of the long flameway their reducing qualities have been largely expended before they get into the stack, the arched design being specially adopted on account of its economical advantages.

The reservoir under each car is 20½ inches in diameter and holds 190 cu. ft. of gas at about ten atmospheres pressure, and can be charged in four or five minutes at some distance with a supply sufficient to light a passenger car three or four nights. The gas lampsgive about double the illumination of the oil lamps ordinarily used at a cost for cleaning and repairs of probably less than half that for oil lamps. The Pintsch plant as erected here will supply 500 cars daily, and it may at any time be doubled in capacity should necessity require; and if one may judge from the neatness and compactness of this supply station and from the general satisfaction the light is giving on the lines using this means of illumination, there will probably be duplications of such distributing points before long. A similar but smaller plant is now being built at Minneapolis by the Chicago, St. Paul, Minneapolis & Omaha, with sufficient capacity for lighting the entire passenger equipment of that line for some years to come. The economy, safety and brilliancy of the Pintsch system certainly recommend it for serious consideration, and at the present rate of increase there will be a majority of the roads in this country equipped with this system within the next few years. The Northwestern is to be congratulated on taking this step in improving the lighting of its trains. The officers contemplate putting this light on all new passenger equipment and on all old cars as fast as they are taken into the shops for repairs.



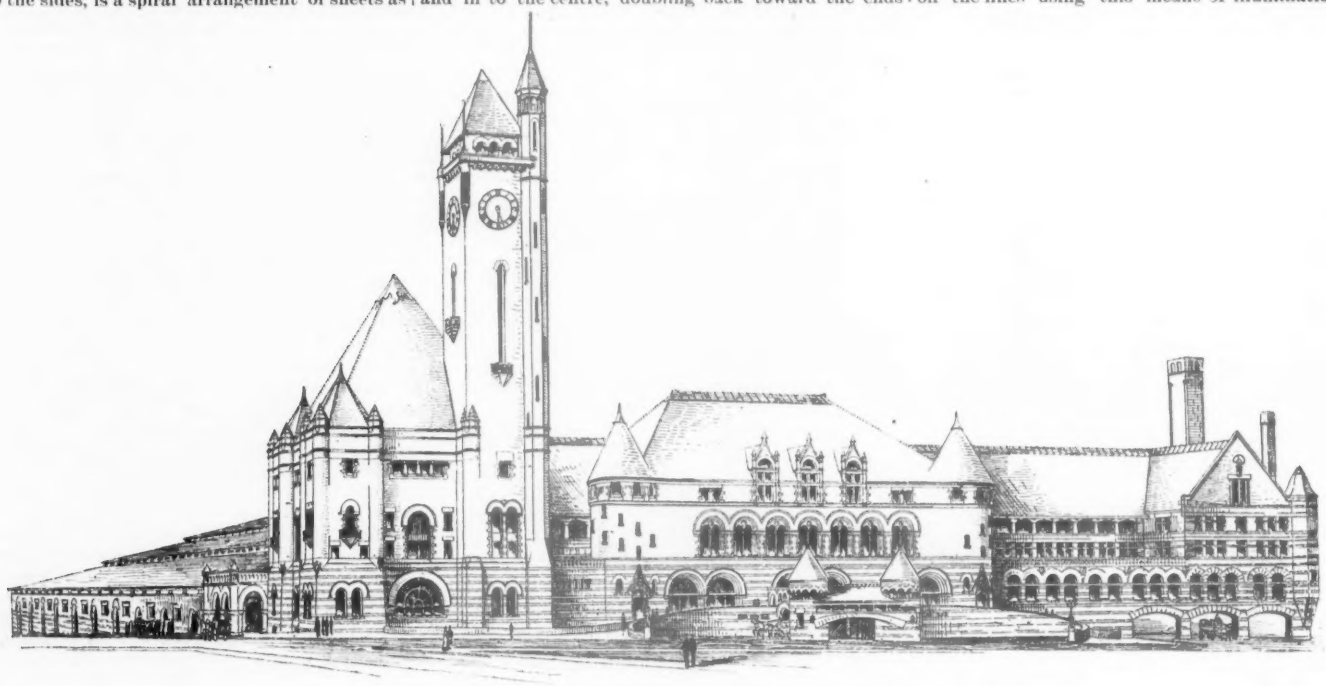


Fig. 1.—NEW UNION PASSENGER STATION AT ST. LOUIS.

To be built by THE TERMINAL RAILROAD ASSOCIATION.

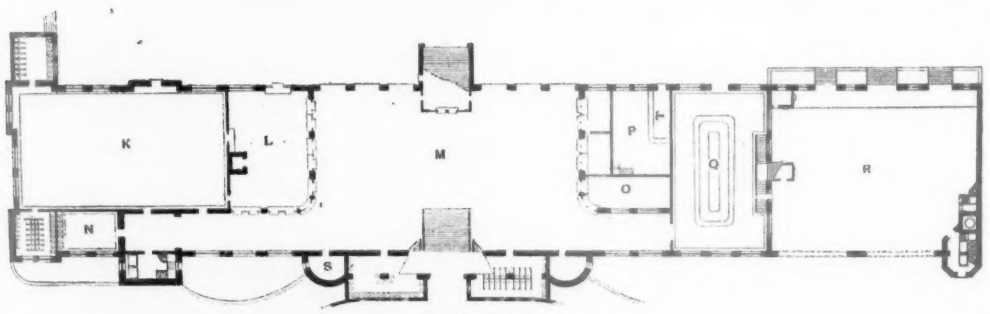


Fig. 2—Basement.

K, Emigrant Waiting-Room; L, Ticket Office; M, Concourse; N, Barber-Shop; O, Mail room; P, Telegraph; Q, Restaurant; R, Carriage Concourse; T, Conductors' Lobby.

The New Union Passenger Station at St. Louis.

The Terminal Railroad Association, operating the St. Louis Union Depot and the Bridge and Terminal Railroad system, some months since acquired land at Twentieth and Market streets for a new station to take the place of the present insufficient quarters, and a number of architects have for some time been at work on plans for the new building. This work has been so far completed that the plans for the main station, but not including the train shed, were decided upon July 8, and we present herewith illustrations showing the accepted plans for the basement and main floors, with a sketch of the front elevation, reduced from the architects drawing. Fig. 5 shows the location of the station as related to the old station, the main line, the bridge, etc. We also show the ground plan of the train shed

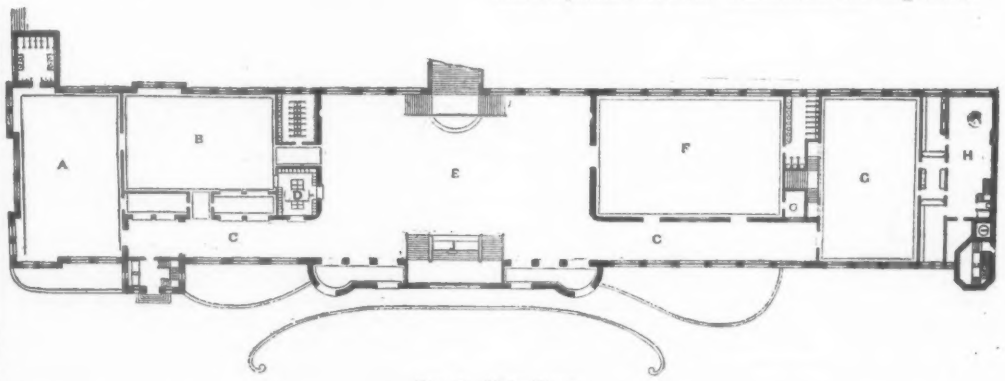


Fig. 3—Main Floor.

A, Smoking-Room; B, Gentlemen; C C, Ambulatory; D, Package-Room; E, Main Hall; F, Ladies; G, Dining Hall; H, Kitchen.

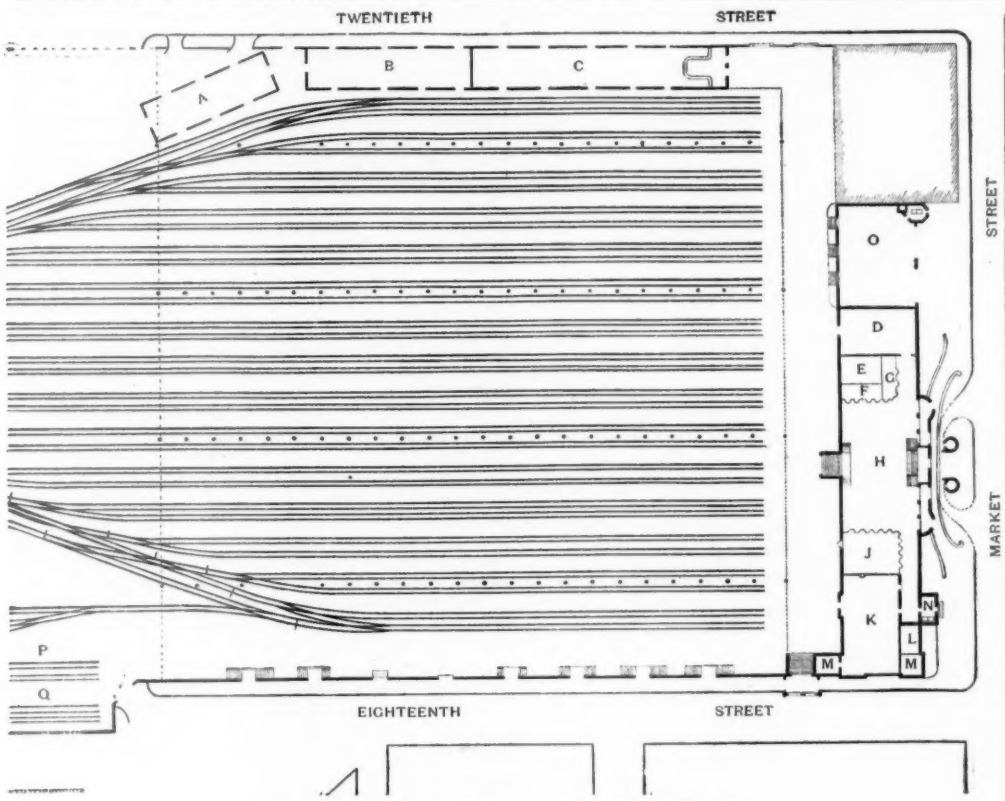


Fig. 4—ST. LOUIS UNION PASSENGER STATION.

With Train-Shed for 30 Tracks.

A, Milk Depot; B, Mail room; C, Baggage-Room; D, Restaurant; E, Telegraph Office; F, Sleeping-Car Ticket Office; G, Railroad Mail Room; H, Concourse; J, Ticket Office; K, Emigrant Waiting-Room; L, Barber Shop; M, M, Toilet-Rooms; O, Carriage Concourse; P, Q, Tracks for Express Companies' buildings 300 ft. south.

(fig. 4), although the details of the structure have not yet been decided upon. The plans here shown, figs. 1, 2 and 3, were those submitted by Messrs. Theodore C. Link and Edward A. Cameron, of St. Louis. Under the conditions of the competition these gentlemen received the first prize, $10,000. The drawings need little description aside from the notes printed underneath each. The train shed, it will be seen, will be larger than any existing station in this country, being 606 ft. wide, including the baggageroom, etc., at the sides, and containing 30 tracks. It is 600 ft. long (to the dotted line at the left), exclusive of the 50-ft. transverse platform between the headhouse and the ends of the tracks, but some of the tracks are 1,000 ft. long. It is not proposed to cover the whole with a single-span roof, there being four rows of pillars for intermediate supports.

The headhouse is 456 ft. long by 80 ft. wide. The basement floor is on a level with the tracks, and the "concourse" in the centre contains 10,530 sq. ft. The telegraph office in this story has a mezzanine floor. The floor of the carriage concourse is on a level with the street and about 4 ft. higher than the track. On the main floor the general waiting-room aggregates 10,530 sq. ft.: the gentlemen's rooms 3,300, and the ladies' rooms, including the retiring and matron's rooms, 5,760; the dining-room 4,500, and the smoking-room 2,340 sq. ft. It will be observed that the main entrance is approached by an inclined walk from either direction, so that there are no steps to climb, and wide stairways on either side of the main entrance lead to the concourse in the basement. The porte cochere is located outside the inclined approaches. The train platforms are reached from the main waiting hall directly by two stairways.

The general waiting-room has ample skylight and ceiling light. There are numerous exits for incoming passengers at the sides of the train shed on the side streets. There are two entrances specially for the office floors in the upper part of the building, and each has two hydraulic elevators. The kitchen, connected with the restaurant, has a separate freight elevator. The plans include a sub-basement 7 ft. 6 in. high, not without some daylight, to protect the basement floor from dampness. The boiler-room is under the carriage concourse. Each of the two office floors has about 30 large rooms.

The architects have made elaborate plans for heating and ventilation, using power fans and heated flues. Steam radiators are provided in every room, and it is proposed that the air forced in by the fans shall be heated only to 70 degrees, so as not to produce an unpleasant draught at the discharge. Dust screens and spray washers will be provided to remove the dust from the air and to moisten it so as to do away with the unpleasant dryness of heated air. It is expected to so arrange the water-closets that the circulation of air will always be from the corridors to the closets and out through the exhaust flues. All the ventilating flues will discharge into the roof space and each will have a self-closing valve at the top.

The outer walls of the building are to be of Missouri gray granite, backed with brick up to the second story sill and brick with stone trimmings above; and the style is Romanesque. The tower will be about 200 ft. high. For the interior decoration of the two main floors materials will be employed which are of a permanent character and will not require painting. The walls of all rooms on the ground floor are lined with enameled brick or tiling about 5 ft. high, and above this buff Roman bricks. They will show exposed ceiling beams and have marble floors. The walls of the main floor, however, are treated with a composition known as art marble. The public rooms in this story have Mosaic floors.

Under the conditions of the competition a second premium of $1,500 will be paid for designs made by Gruber & Weber, of St. Louis; and Van Brunt & Howe, of Kansas City, secured a third premium of $1,000. Five other competitors will each receive $500 for their work, which becomes the property of the association. The chairman of the Association has invited proposals from builders for the construction of the building, on which, together with the train sheds, etc., it is proposed to spend $800,000. The grounds, which are now occupied by a large brewery, a flour mill and a gas-works, cost about $1,250,000.

Oil Fuel in Peru.

On April 30, 1890, the Oroya Railroad, in Peru, began a series of tests to determine the relative economy of oil and coal as a fuel for locomotives. Two engines of the mogul type, built by the Rogers Locomotive Works, of Paterson, N. J., and exactly alike in every detail, were put into service on one of the regular passenger runs to Verrugas, which is 5,800 ft. above the sea. The engine cylinders were 18×24 inches; driving wheels, 47 inches; weight of engine, 38 tons; tender, 28 tons; weight of train, including tender, 118 tons. The oil used was not crude petroleum, but a residuum oil with a fire test of 300° Fahr.

Little alteration was made in the firebox. The back damper is completely closed, and a large front damper, with about 2 sq. ft. superficial opening, is arranged in front. A plate is placed on top of the ashpan, extending from the front of the firebox to about the centre of the ashpan. Air is admitted through an opening 20 in. by 14 in., cut through the plate near the centre of the pan. This plate supports the fire brick at the front of the firebox, which receives the vaporized oil. These firebricks are built up to a height of about two feet, and the whole is surmounted by a brick arch extending to within 18 in. of the back end of the furnace. On the sides of the furnace the brickwork extends 2 in. above the mud ring. Only 150 bricks are used for the whole brickwork, including the arch.

The burner is attached to the bottom of the firebox at the back end. It is a cast-iron rectangular box divided lengthwise into two compartments, one above the other. The upper one is the oil passage; the lower one the steam passage. Both these passages are 3 in. wide by ¾ in. deep. The oil passage is tapped at the rear end for 1¼-in. oil pipe, and the steam passage is tapped for a ¼-in. steam pipe. The aperture for the oil passage is 3 in. by ¾ in.; the steam aprrature is 3¼ in. by $\frac{1}{10}$ in. The oil falls on the steam, and is completely vaporized. With this burner the bricks do not serve in any way for breaking up the oil, but merely as a white-hot retort, in which air and vaporized oil are mixed. The supply of air is regulated by the front damper, the supply of oil by a gate valve worked by a wheel under the fireman's hand in the cab. The fuel and air are under complete control of the fireman, whereby a perfect combustion with no smoke is obtained.

The steam gauge on the oil-burning engine showed very slight variation, standing almost constantly at 140 pounds. The average consumption of oil was 38.55 pounds per train mile, and that of coal 79.30, or slightly more than double. The road has adopted oil as a fuel for locomotives, and the engines are being altered accordingly.

The Suburban Rapid Transit Railroad, New York City.

The design, construction, equipment and operation of elevated structures for fast service railroads in cities have received a good deal of attention from engineers in all civilized countries since the immense success of the elevated railroads of New York proved the utility of such structures. To-day the subject has probably a wider interest than ever before, for, although there are no lines of great magnitude now building, short lines are under consruction in various cities, and the question of city transit is being perhaps more widely and seriously discussed than ever before. It gives us pleasure, therefore, to lay before our readers a pretty comprehensive account of one of the most intelligently constructed and equipped elevated roads that has yet been built. Mr. J. J. R. Croes, the chief engineer, had from the first some especial advantages. He had before him the example of the New York and the Metropolitan elevated lines; he was thoroughly familiar with the ground to be covered, and he had to an unusual degree the confidence and backing of his Directors. He produced a structure which is remarkable for its simple and workmanlike design and put on it efficient rolling stock.

The Suburban Rapid Transit Company, which has re-

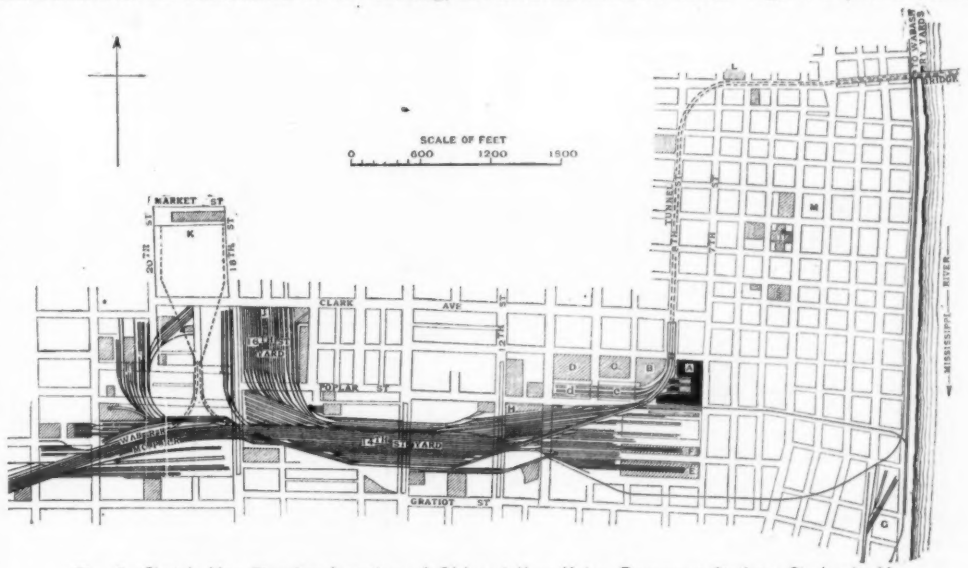
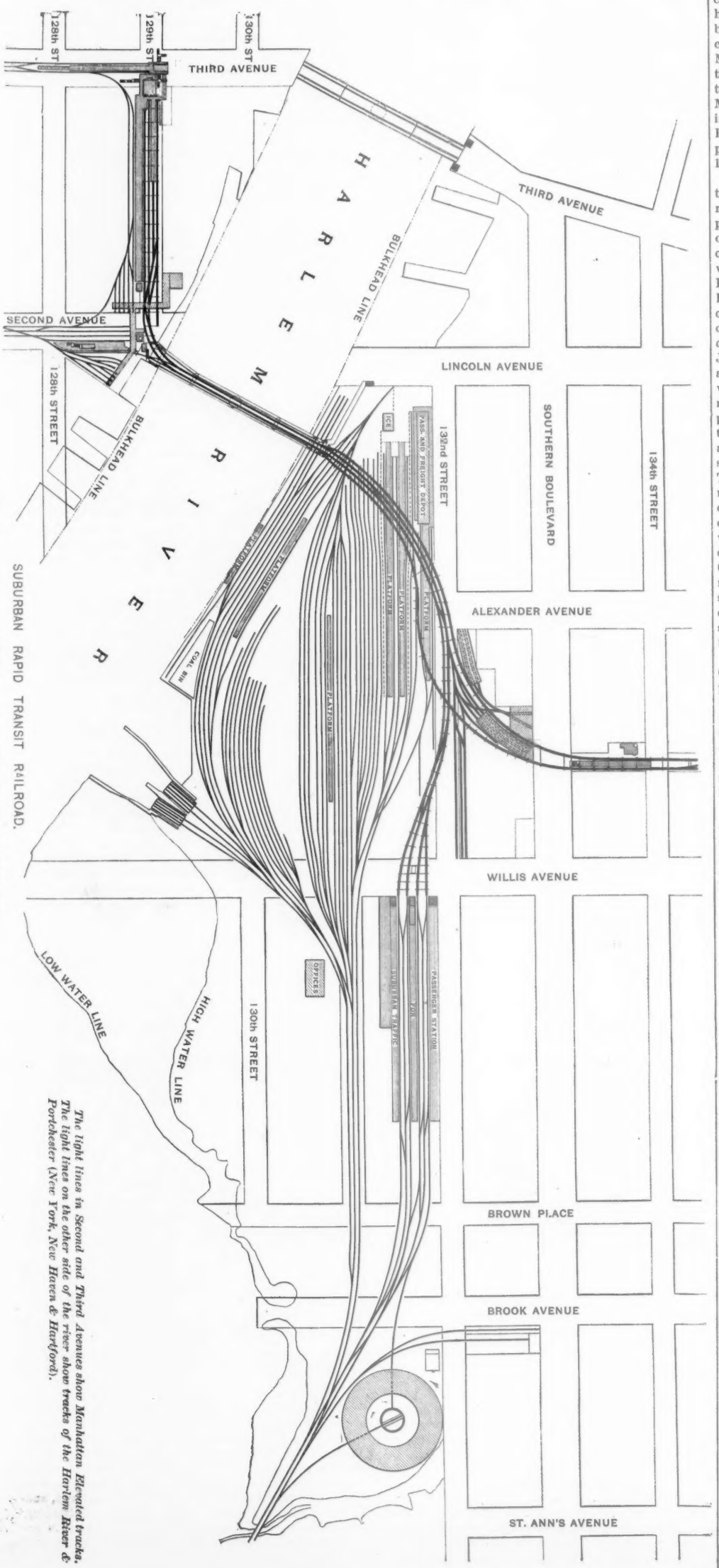


Fig. 5—Sketch Map Showing Location of Old and New Union Passenger Stations, St. Louis, Mo.

H, present Union Passenger Station; K, new Union Passenger Station; A, E, F, G, Freight Stations; L, Lindell Hotel; M, Merchants' Exchange; S, Southern Hotel; T, Court House.



SUBURBAN RAPID TRANSIT RAILROAD.

Terminal Stations at 129th Street and 132d Street, New York City

The light lines in Second and Third Avenues show Manhattan Elevated tracks. The light lines on the other side of the river show tracks of the Harlem River & Portchester (New York, New Haven & Hartford).

cently been purchased by and incorporated with the Manhattan Elevated Railway Company, was organized October 11, 1880, in accordance with the requirements of a commission appointed by Mayor Edward Cooper on March 6, 1880. The appointment of this commission and the organization of the company were due almost entirely to the efforts of Mr. Samuel R. Filley, who had resided in Morrisania for a number of years and had taken a great interest in the improvement of the territory north of the Harlem River. Mr. Filley was the President of the company from its organization until his death on Jan. 8, 1888.

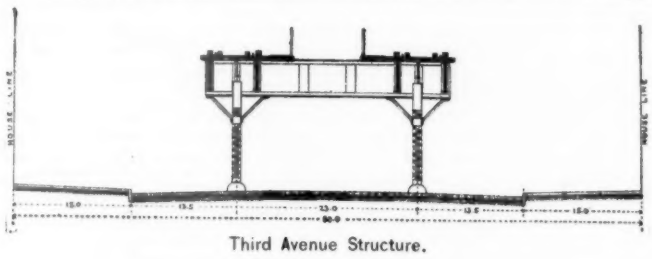
The routes laid out by the commission were designed to furnish communication between the elevated railroads south of the Harlem River and the entire eastern portion of the Annexed District, as it is generally termed, or the Twenty-third and Twenty-fourth wards, as it is officially designated, which comprises the territory within the New York city limits north of the Harlem River, equal in area to Manhattan Island south of the Harlem River. The commission laid out about 15 miles of routes, extending from Eighth avenue and 155th street on one side and Second and Third avenues at 129th street on the other side to the Bronx River on the east, and to Jerome Park in the central part of the territory to be accommodated. All of these routes differed from those which had been laid out by previous rapid transit commissions in that they were located entirely on private property, to be acquired for purposes of the railroad by the company. None of the roads to be built were located along the lines or streets, and it was required that all streets should be crossed either over or under grade. The specifications and conditions imposed by the commission did not attempt to describe the exact character of the structure to be built, but merely prescribed the conditions as to strength and stability which should prevail in any structures which were to be erected. The engineers of this commission were William E. Worthen, C. E., who is engineer to the present Rapid Transit Commission, and J. J. R. Croes, who had been connected for several years with the Department of Public Parks, in charge of the topographical surveys, the planning of the street system and the designing of the sewerage system for the Twenty-third and Twenty-fourth wards.

On the organization of the Suburban Rapid Transit Company, Mr. Croes was made its Chief Engineer, which position he held until the sale to the Manhattan Company on June 4, 1891. The legal preliminaries, including the consent of the various city departments and the settlement of various suits brought by dissatisfied persons, occupied three years, so that it was not until Oct. 10, 1883, that the first contract was made, which was for the construction of the piers for the drawbridge across the Harlem River at the end of Second avenue.

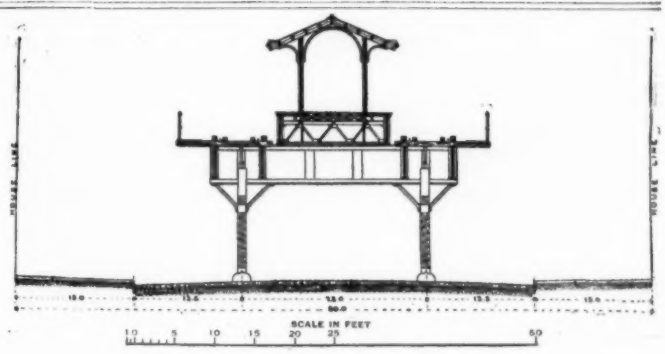
The bottom of the river at this point is compact sand and gravel. At the site of the bridge the bottom was dredged out to a depth of 32 ft. below mean high water, and the masonry was laid in floating caissons, which sunk to place as the work progressed. The inequalities left by the dredge in the bottom of the river were filled with broken stone, the surface of which was leveled off by divers. No settlement of the masonry has taken place. The piers are built of granite. The centre draw pier is hexagonal in form below the water level and circular above water and 32 ft. in diameter. Only the exterior wall of this is built of cut stone, the heart being filled with concrete. There are three spans. The two short spans are each 94.6 ft. in the clear and the draw span has two openings each of 103.75 ft. in the clear. The law required that the under side of the bridge should be not less than 24 ft. above the highest spring tide. It is 28.5 ft. above mean high tide level. The superstructure is a pin-connected, wrought-iron, truss bridge, designed by Theodore Cooper, C. E. The machinery for operating the draw is placed in a tower over the tracks at the centre of the brigde and consists of a small steam engine driving compressors which charge a receiving tank with compressed air, which operates two rams, to which are attached wire cables, which pass down under the floor of the bridge and are attached to the live ring. The motion of the rams in one direction or another pulls the cable and revolves the draw in the opposite direction to the pull upon the live ring. This machinery will open or close the draw in a minute, and has worked very successfully for five years, during which time the draw has been opened 45,600 times to admit of the passage of vessels. The draw span weighs 700,000 pounds. There are two operators in the tower at all times, who also throw the signals and operate the switches at each end of the bridge.

South of the Harlem River the company's routes include only 129th street from Second to Third avenue. This street is occupied by a plate-girder viaduct, the elevation of which is shown in the accompanying engraving. It consists of plate iron cross-girders supported on columns placed at the curb line of the street and carrying plate girders on which the track timbers rest. The terminal station is near Third avenue, where connection is made with the Third avenue line of the Manhattan Railway. Direct track connection is had at Second avenue with the Second avenue line of the Manhattan Railway.

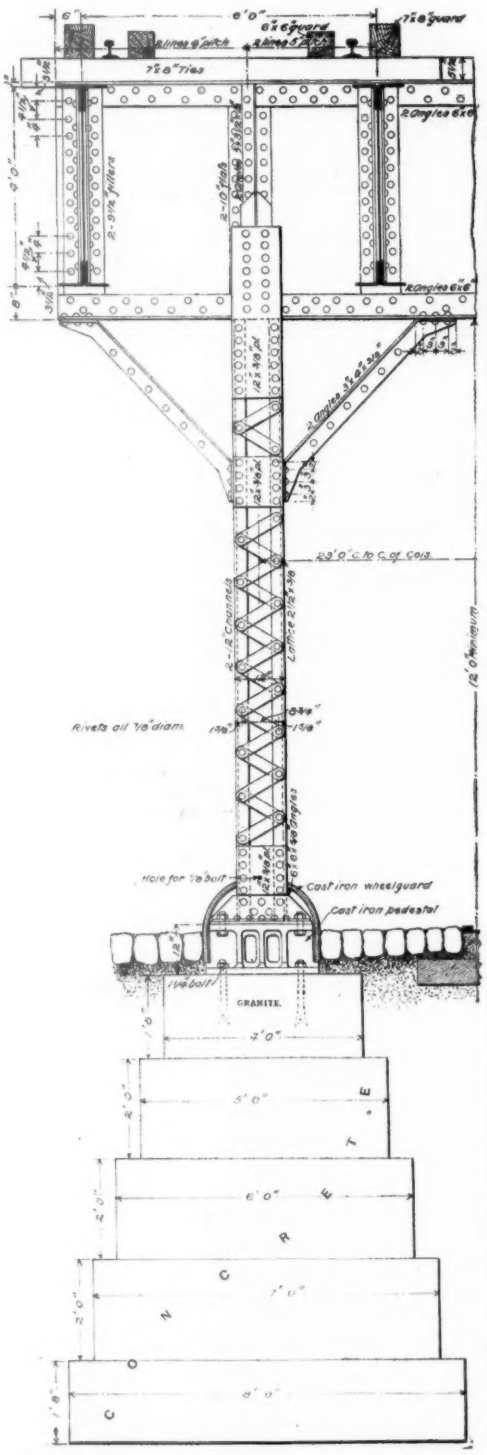
At the north end of the bridge a double-track structure is built over the freight yards of the Harlem River & Portchester Railroad, on a descending grade for about 1,300 ft. to the east side of Willis avenue, where direct connec-



Third Avenue Structure.



Third Avenue Structure at Station.



Standard Column and Superstructure on Third Avenue.

SUBURBAN RAPID-TRANSIT RAILROAD, NEW YORK CITY.

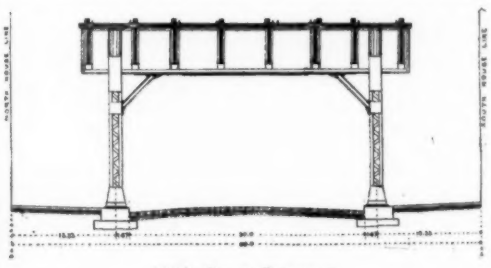
tion is made with the surface track of the Harlem River & Portchester road, and a handsome transfer station has been erected by that company to accommodate rapid transit travel to New Rochelle. This connection has only recently been made. Under the contract between the Suburban Rapid Transit Co. and the New York, New Haven & Hartford (operating the Harlem River & Portchester) the connection was to have been made and rapid transit service from 129th street to New Rochelle begun on June 1, 1891. The Suburban Co.'s portion of the work was completed by that date, but the other company's station and track are not yet ready for travel.

At the north end of the Harlem River bridge the tracks of the Suburban Rapid Transit Co. diverge, running one on each side of the inclined viaduct just mentioned, and the up track crosses the H. R. & P. connection over grade about 800 ft. from the bridge. The two tracks then approach each other until at the Southern Boulevard station, the first on the Suburban line, they are 24 ft. apart, and they are maintained at this distance pany's station throughout the whole of the road.

The structures up to this point all consist of plate-iron girders, resting on channel-iron columns. The necessity for not interfering with the tracks in the freight yard of the Harlem River & Portchester required a peculiar arrangement of the supporting columns and cross-girders, as is seen by the accompanying plan of the structures and tracks. The space between 132d street and the Southern Boulevard lying north of the Harlem River & Portchester yard, which is crossed diagonally by the Suburban viaduct, has been utilized for storage yards and machine shops of the Suburban Co. in a very compact and effective manner.

The foundations for the numerous columns supporting the iron structure over the low ground between the Harlem River and the Southern Boulevard are simply blocks of concrete, capped with a block of granite, to which the bases of the wrought-iron columns are bolted. In excavating for about half of the foundations soft bottom was encountered. In such cases nine piles were driven, capped with 12-in. timbers and concrete filled in around them. Where firm, sandy bottom was encountered, concrete was placed on the sand about 6 ft. below the surface. No settlement has occurred and the structure maintains its form well.

From the Southern Boulevard to 145th street the line of the Suburban road is on a purchased right of way 50 ft. wide. The tracks are supported on plate girders which rest upon piers of brick masonry with foundations of concrete below the surface of the ground. The brick



129th Street Structure.

piers are capped with granite. This mode of construction was found to be cheaper than iron columns would have been in this location.

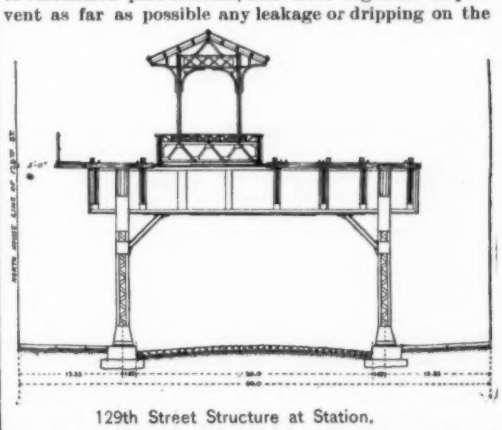
North of 145th street the line departs from the chartered route of the Suburban Co. and follows Third avenue for a distance of two miles, under the charter of a rapid transit road which was procurred in 1881 in opposition to the Suburban Co. and was absorbed by it in 1886. This change of route was necessary to secure extension of the construction at that time, inasmuch as in the interval between the organization of the Suburban Rapid Transit Co. and the construction up to this point a special commission appointed by the legislature had laid out a series of new parks, overlying the chartered routes of the company. The city government disputed the right of the Rapid Transit Co. to occupy its routes through these parks and a long litigation ensued, the final result of which is now pending in the Court of Appeals.

South of 145th street the structures are all designed to carry a 50-ton locomotive followed by a rolling load of 3,000 lbs. per foot. The elevated structure on Third avenue is designed to carry a 30-ton locomotive followed by a rolling load of 2,000 lbs. per lineal foot. In the designing of all the structures it was aimed to secure a maximum of efficiency with a minimum of cost and at the same time to make the structure of as simple construction as was practicable. The foundations are all of concrete. In the streets the excavation is carried down below all sewer or pipe connections and the foundation built up of cubical blocks of concrete, generally 10 ft. square at the bottom and reduced every 2 ft. in height until tney are 4 ft. square at the top, which is about 30 in. below the top of the street pavement. On this concrete is placed a block of granite 4 ft. square and 20 in. high. To the granite is bolted a cast-iron pedestal, extending up to a little above the pavement of the street. To this pedestal the wrought-iron column is bolted and the pedestal and base of the column inclosed in a cast-iron hood in two sections, bolted together. The object of the cast-iron pedestal is simply to prevent the wrought-iron of the columns from being brought in contact with the earth, and to reduce the area of the column at the surface of the street so as not to interfere with travel. The columns are held firmly in place by the cast-iron pedestal and granite base stone, which together weigh about 5,000 lbs.

At their upper end, the columns, composed of two channel irons, connected by lattice bars, are riveted firmly to the cross-girders, and to these in turn are riveted four longitudinal girders carrying the track. Each span, therefore, is like a strongly built table, the legs of which are secured to the frame, and, moreover, are heavily weighted at the bottom. To provide for expansion, the girders at each fifth span longitudinally are not riveted to the cross-girder on one side, but supported in a bracketed pocket, so that, in point of fact, the structure consists of a series of eight-legged tables, each one with a leaf supported at its outer end on the next table. The design of this structure is due to Mr. Theodore Cooper, who has been the consulting engineer on all iron structures. The spans are from 38 to 44 ft. The weight of the wrought-iron structure for double track is 933.5 lbs. per linear foot. The average weight of the structure as built, including the cross-overs and sections of middle track, is 992 lbs. per linear foot.

The track superstructure differs somewhat from that in use on the Manhattan Railroad. The requisite strength and stability of the structure being secured by the design and construction of the substructure, smoothness and durability are only to be required for the track These the engineer considered could be best attained by making the bearing of the rails as uniform as practicable and making this bearing as durable as possible. In pursuance of this principle the ties are all of pine timber, impregnated with 14 lbs. of dead oil of coal tar to the cubic foot. They are 7 in. in height by 8 in. wide, spaced 14 in. between centres and notched down ⅛ in. on the cross-girders. Every third tie is fastened to the girders by a hook bolt. The rails used weigh 60 lbs. to the yard, and care was taken in laying the ties that the top surface should be uniform, so as to give a uniform bearing to the rails. The ties are further secured in place by longitudinal guard timbers on each side of the rail, fastened down to the ties by lag screws. Any uneven wearing of the ties or cutting by the rails is obviated by the use of steel shim plates of different thicknesses, a stock of which is kept on hand by the maintenance force.

On the structure in 129th street the flooring is composed of vulcanized pine timbers, laid close together to prevent as far as possible any leakage or dripping on the



129th Street Structure at Station.

street below, which is entirely covered by the tracks and the numerous cross-overs at the terminal station.

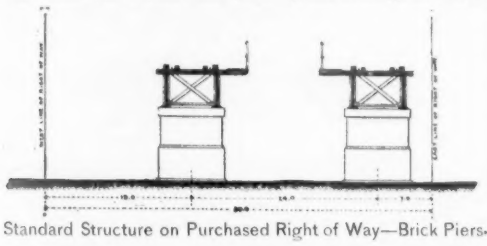
The stations on the line are all located between the main tracks and are of very simple and at the same time neat design. They are all furnished with water closets and are heated by hot water apparatus, the furnace and boiler for which are in a small chamber suspended beneath the station.

The length of road now in operation is 3.08 miles, with 10 stations. An additional length of 0.63 mile, with 2 stations, will be completed and opened within a month.

ROLLING STOCK.

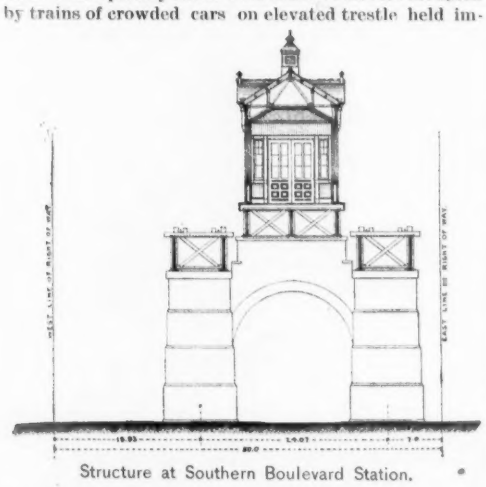
The first mile of road was put in operation in May, 1886. The locomotives were built by the Baldwin Works of Philadelphia. Ten of them are of the Forney type and weigh 55,000 lbs. each. In three locomotives procured in 1888, and which weigh 58,000 lbs., the tank is placed over the boiler, and there are two pony trucks, one forward and one back of the drivers. All of these engines have done very good and economical service. Some of the runners

object to the saddle tank in the last engines procured as interfering with their view when running ahead but otherwise they are believed to possess some advantages over the other type. As regards consumption of fuel the records show the latter type to be slightly more economical when operated under similar conditions. The engine service on so short a road is necessarily of a character not calculated to show great economy in coal consumption. From 5:15 a. m. to 12:30 at night trains are run on 5 to 8 minute intervals. The running time from terminus to terminus, 2.87 miles, is 14 minutes, including 9 intermediate stops. A relay engine at each terminus takes the train back, the incoming engine waiting for the next train. There are thus from 8 to 9 engines in service at once, the term of service ranging from 18 to 20 hours, and one of them only being out 3 hours in the morning and 4 in the afternoon. While in service each engine is only hauling trains for 60 per cent. of the time, the remaining 40 per cent. being taken up by relay duty. During the first five months of the present year, with a train mileage of 1,154 miles per day, the average coal consumption by the engines was 33.75 lbs. per train mile. This includes all the coal consumed for firing up and while standing still.



Standard Structure on Purchased Right of Way—Brick Piers.

The advantage of the rigid structure and the heavier rolling stock of the Suburban was shown in the "blizzard" of March, 1888, when this was the only transportation line within a radius of probably 100 miles from the New York city hall which did not succumb even for a few hours and suspend the running of trains. The other New York and Brooklyn elevated roads had not the strength of structure nor the efficiency of motive power to draw full trains against the resistance offered by the snow which drifted in between the timber guard-rails, and trains which had once started from the terminals could not be moved by the engines nor could they be lightened by dropping some of the cars, because there was no place in the streets to deposit the superfluous cars. Consequently there were miles of streets occupied by trains of crowded cars on elevated trestle held im-



Structure at Southern Boulevard Station.

movable by little gutters full of snow. But the 28-ton engines of the Suburban kept running regularly to and fro on its substantial viaduct, the cars loaded with passengers, while half a mile away hundreds of people were snowbound in the cars of the New York Central and the New Haven roads in deep cuttings and in the sunken way through Harlem, and thousands were stored away in the elevated railroad cars in the avenues of the city, unable to get forward, backward or downward.

The cars of the Suburban are similar to those of the Manhattan Railway. The number of passengers carried over the road averages 13,000 per day, which is about the same number as are carried on the new subterranean road in London, of which so much has been said recently and which this amount of travel taxes to its utmost capacity. The Suburban road, of about the same length and much less cost, has a capacity with its present equipment of ten times that amount of traffic. The earnings from traffic have exceeded the entire expenses of operation and maintenance since August, 1887.

The Burlington 22 × 28-in. Decapod.

WITH AN INSET.

We give on an inset this week a half-tone cut of one of the new decapods built by the Rogers Locomotive & Machine Works, of Paterson, N. J., for the Burlington & Missouri River line of the Chicago, Burlington & Quincy. The general design for these engines was made by the mechanical department of the road at Aurora, but many of the details were devised by the Rogers Works. This design, on which three engines have been built, has all of the improvements so well known as being successful on the class "H" engines of the Burlington. These decapods as well as the class "H" engines well deserve to be classed among the most completely equipped locomotives in the West. Such attention to small parts and conveniences slightly increases the first cost but materially enhances the value of the completed engine and reduces the cost of repairs by decreasing the need for them. The general dimensions of these decapods are as follows:

Total weight in working order	150,300 lbs.
Total weight on driving wheels	150,300 lbs.
Diameter of driving wheels	50 in.
Diameter of driving-axle journals	8 in.
Length of driving-axle journals	8¾ in.
Total wheel base of engine	17 ft. 10 in.
Total wheel base of engine and tender	45 ft.
Diameter of cylinders	22 in.
Stroke of cylinders	28 in.
Style of boiler	straight-top Belpaire
Working pressure	160 lbs.
Shell of boiler	of steel, 7/16 in.
Outside diameter of smallest boiler ring	68 in.
Length of firebox inside	132 in.
Width of firebox inside	41 in.
Depth of firebox, crown sheet to top of grate, front	56½ in.
Depth of firebox, crown sheet to top of grate, back	54 in.
Number of tubes	229
Outside diameter of tubes	2¼ in.
Thickness of tubes	No. 11 Birm. W. G.
Length of tubes	14 ft. 6 in.
Grate surface	37½ sq. ft.
Heating surface, firebox	180 sq. ft.
Heating surface, tubes	2,171 sq. ft.
Heating surface, total	2,352 sq. ft.
Dry pipe of wrought iron, diameter	7 in.
Branch steam pipes of wrought iron, diameter	6 in.
Smoke-box front of pressed steel	
Exhaust nozzle, single, high; diameter	5⅛ in.
Size of steam ports	1⅞ × 17½ in.
Size of exhaust ports	3¼ × 17½ in.
Throw of eccentric	5 in.
Greatest travel of valve	6 in.
Outside lap of valve	13/16 in.
Smallest inside diameter of chimney	19 in.
Height, top of rail to top of chimney	15 ft. 6 in.
Height, top of rail to centre of boiler	7 ft. 7½ in.
Water capacity of tender tank	3,480 gall.
American equalized driver-brake levers operated by Westinghouse automatic air-brake fixtures.	
Injectors, two No. 10 "Monitor"	
Weight of water in the boiler at two gauges	13,900 lbs.

The tender is of the C., B. & Q. standard pattern, with wrought-iron and steel trucks, collarless axles and of extra strength. The boxes, which can be seen on the front of the tender, and over which there is an iron roof for the protection of the fireman, are used for tool-boxes and for oil cans, etc.; each box has a door on the front side. The roof over the boxes also serves for a seat for the rear headlight. The tender is fitted with a pilot, as the engine is to act as a pusher on steep grades and will run down hill backward.

All of the material in these engines is the best of its kind. The rods and pins are of steel. The steam pipes in the smoke box are of wrought-iron, lap-welded pipe, ¼ in. thick, 6 in. diameter inside, bent hot around a cast-iron former in a bending machine. The flanges of these pipes are all of brass, put on with screw rivets and caulked tight, thus making a lighter pipe than those of cast iron. The boiler fronts are of Fox solid pressed steel.

The lightness of the pressed-steel cylinder-head casing and smoke stack base, the stack, steam pipes and boiler front promotes the proper distribution of the weight on drivers, and these parts give the engine a neat and smooth appearance. The slides in the bottom of the ash pan and the grates are moved by an air cylinder, properly mounted, as on the class "H."

The Corinth Canal.

This historic enterprise seems at last to be nearing completion. Its necessity has been recognized from the earliest times, and its construction has been advocated by many potentates, among them the Roman emperors Julius Cæsar, Caligula and Nero, the latter of whom actually undertook the work, with great pomp and ceremony turning the first sod with a golden spade. Considerable excavations were then made, but wars caused the abandonment of the enterprise.

In 1882 a company was organized, with M. De Lesseps as President, to construct this canal, and a route was located coinciding exactly with that laid down by the engineers under Nero, and the inauguration of work was attended with ceremonies scarcely less imposing than those of the old Roman emperor. The failure of the Comptoir d'Escompte, however, brought matters to a standstill a second time, but after two years' cessation labors were resumed by a Greek company of contractors and excavations are now proceeding systematically under the supervision of Chief Engineer Mavrocordato.

According to a letter from Mr. Horace White the length of the canal will be a little less than four miles. "The ground rises rather abruptly at either end, and continues to rise gradually to a point about midway, where it is 260 ft. above water level. The cut is to be carried 22 ft. below water level, and the width at bottom is to be 86 ft." The slope of the banks is 60 degrees, the material consisting of an indurated calcareous tufa, tough enough to require blasting. At one place there is "a wall of true limestone," a part of the backbone of Greece. Steam dredges, or excavators, of the endless-chain-of-bucket type are employed. An open cut is run forward as far as convenient, and then a tunnel is driven into the hill until the thickness of superincumbent earth reaches about 25 ft. Shafts are then sunk at regular intervals to the tunnel. Track is laid in the tunnel, and cars under the respective shafts receive the earth which is shoveled in from above. Twelve hundred laborers are at present employed on the works, and the completion of the canal is promised by 1894. The laborers consist of Armenians, Italians and Montenegrins, and the wages paid equal about 60 cents a day.

Being a sea-level canal, and admitting the largest merchant ships, it will be easy of maintenance, and an inexpensive convenience to commerce. The prospective traffic which will in the beginning use the canal was figured by the original French company at 4,500,000 tons per annum. The present importance of the Corinth Canal will be almost entirely local, serving the commerce of the Adriatic and eastern Greece, and shortening the route between the Bosphorus and the western coast of Italy.

There are other projects in the air, however, one for a trans-Italian canal, and another for the deepening of the old Languedoc Canal to admit sea-going vessels to pass directly from the Bay of Biscay to the Mediterranean. In the event of these ever being constructed the Corinth Canal will become an important part of a short line from England and the West European ports to Constantinople and the Black Sea, saving a distance of a thousand miles over the existing route by way of Gibraltar.

A Remarkable Sink-Hole.

Sixteen miles west of Chicago on the Chicago, Burlington & Quincy, there is a remarkable sink-hole. As the eastbound train passes from a 20-foot cut, a passenger may observe a small flat, some 15 or 16 ft. below grade, 1,000 ft. across and extending half a mile on either side the track. This flat is grown over with slough grass and cats'-tails, and is partly covered with water. When the grading for the first two tracks was done several years ago, trouble was caused by the sinking of the embankment. Piles were driven but to no avail. The roadbed was completed by filling in until the embankment stopped sinking.

Last summer when the embankment was being widened for a third track, it again began to sink, sometimes from 1 to 3 ft. in a night, sinking altogether 40 ft. For two months a large construction gang worked steadily on the fill without gaining a foot. The earth under the embankment instead of becoming more compact was pressed out and up, actually moving the telegraph poles 12 ft. farther from the track and raising a ridge 10 ft. high. As there is an end to all things, equilibrium was finally established and the track brought to grade.

About 95,000 cu. yds. of gravel and dirt were required to fill the sink. The cost of labor and material for the 1,000 ft. of embankment, including the new road bed and the fill on the old one, was $10,000, or $10 a linear foot, about seven-tenths of which was owing to the sink-hole. Trains had to slacken to four miles an hour, which added much to the expense, particularly as some days more than a hundred trains passed over the road.

No borings were made to determine the strata, which perhaps was not wise, since a complete knowledge of the ground might have led to a plan which would have saved considerable expense.

The flat is underlaid by a stratum of Niagara limestone. Although underground caves are often found in strata of rock, yet this cannot explain the sinking, for the roadbed would have sunk rapidly rather than gradually, had the dome of a cave which supported it suddenly given away. Besides, this would not explain why the earth was displaced along the sides of the embankment. Apparently the roadbed rests upon either a bed of quicksand or a bed of clay saturated with water. Either material, with bed-rock under it and a tough crust of earth over it, would have a tendency to transmit pressure to all confining surfaces. When a load great enough to exceed its ultimate strength was put upon the crust, it gave way, thus transmitting the pressure to the quicksand or saturated clay below. The sand or clay in turn transmitted the force of the load, as upward pressure, against the under side of the surrounding crust. As the load of the embankment was increased, the upward pressure against the crust increased, until finally the surface in the neighborhood of the telegraph poles was raised into a ridge. The quicksand or saturated clay followed the displacement of the crust, while the embankment followed the displacement of the quicksand or clay. As more dirt was added to fill the sink the load was increased, at last producing such a strain on the ridge that it cracked open, leaving a gap 2 or 3 ft. wide.

The McDowell Safety Check Valve.

Apropos of our discussion last week of the proper form of check valve for injectors we illustrate to-day a form of check valve by the use of which the possibility of serious injury to persons by scalding water issuing from this orifice of a locomotive boiler during a wreck is made exceedingly remote. This valve is largely used on the Pennsylvania and some other roads, and is, we are informed, giving perfect satisfaction. It has on several occasions proved to be reliable when the piping and external parts of the check have been broken off in a wreck. Its construction is as follows:

On a large external flange, shown in fig. 1, which is bolted to the boiler by eight ¾-in. studs, there is arranged (on the interior of the boiler) a seat for a swinging valve shown at *A*, fig. 2. The valve is plain with flat seats, and has a stem on the inner side which passes through a swinging lever *B*, which is fulcrumed to a lug at *C* on the inner side of the large flange just referred to. The stem of the flat-seated valve is secured by means of a collar and a split pin. Some forms of safety check have been troublesome because they could not be reached to be repaired. With this design such is not the case. As the valve swivels readily in the swinging lever, it can be grooved to its seat without removing it from the boiler by means of the hook shown in fig. 3, the end of which is bent to catch into the hole on the outside of the valve at *D* (fig. 2). This is a well-designed device, and presents a much neater appearance on a locomotive boiler than the old-fashioned screw shank check, and in addition it furnishes almost perfect immunity from in-

* By R. A. Mather, in *The Technograph*.

jury by scalding to passengers in a wreck or to trainmen in a caboose in rear or side collisions. We do not know what was the style of check used on the locomotive which caused such a large loss of life July 11, but it is safe to say that it was not a safety check, for there is nothing in any of the accounts to indicate that the boiler shell was ruptured.

TECHNICAL.

Manufacturing and Business.

The New York, New Haven & Hartford is equipping all its freight cars with the Janney car coupler.

The Rail Lock Joint Co., of Poughkeepsie, N. Y., recently formed, has elected Thomas J. Swift, of Poughkeepsie, N. Y., President. The capital stock is $250,000.

The Lansberg Brake Co., of St. Louis, Mo., will add an additional story to its shop and put in $15,000 worth of new machinery. The company is now said to be turning out brakes at the rate of 150 a month.

The Radford Pipe & Foundry Co., of Cincinnati, which has leased the Anniston (Ala.) Pipe Works, will put them in operation immediately, and has already secured orders which will keep the works in activity during the summer.

The Buffalo Scale Co., of Buffalo, N. Y., has recently furnished railroad track scales in Buffalo for the Lehigh Valley, Delaware, Lackawanna & Western, Delaney Forge & Iron Co., Gould's steam forge and A. Rumsey & Co.'s tannery, and have furnished numerous large hopper scales for the Ontario, Evans and Wheeler elevators.

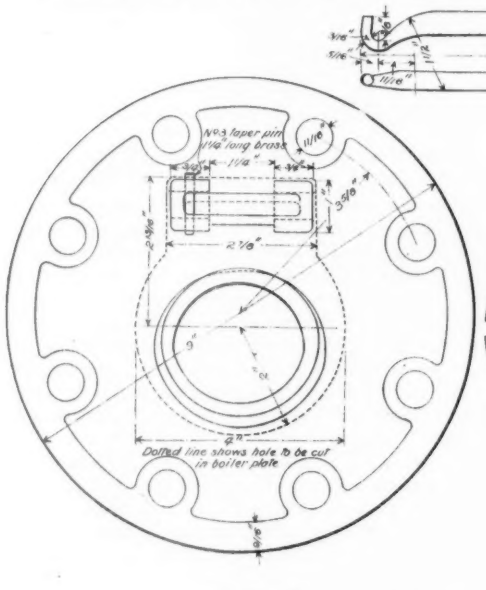


Fig. 1.

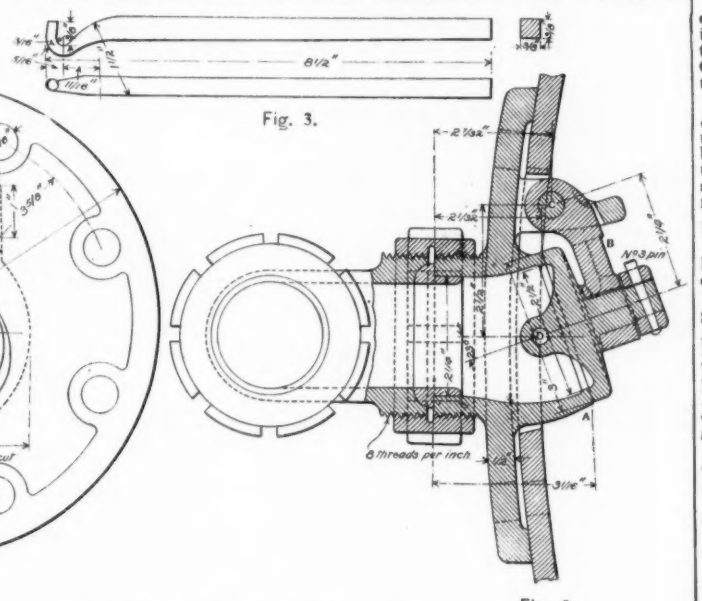


Fig. 2.

McDOWELL'S SAFETY CHECK VALVE.

Since Jan. 1 the company has furnished a large number of railroad track scales to the New York, Lake Erie & Western, Chicago & Grand Trunk, Lake Shore & Michigan Southern, Denver & Rio Grande, Southern Pacific and others. These scales are now used almost exclusively by the American Express Co.

Iron and Steel.

The Norristown Steel Co. has its new steel casting department, at Ernest Station, Norristown, Pa., nearly ready to start up. The company will use the Adams process in connection with its open-hearth furnace, and to take the stock to the cupolas and furnaces it is putting in a Ridgway elevator of 28 ft. lift. The steel-casting building is 90 ft. × 160 ft., contains two modern 15-ton open hearth furnaces with a weekly capacity of 500 tons, and also a 3-ton cupola furnace. This building is equipped with a 30-ton overhead crane built by the Morgan Engineering Co., of Alliance, O.

The Thames Iron Co., of Pennsylvania, has leased the Belvidere Iron Mines, at Belvidere, N. J., and will put in machinery to work them, employing a large force of men.

The Bates Iron & Steel Co., whose foundry at south Chicago, was burned last fall, has decided to locate its foundry in Waukegan, Ill.

The Southern Steel Co. has decided to increase its capital stock to $1,000,000. T. T. Hillman, of Birmingham, Ala., and others, are organizing this company to build the steel plant at Ensley City. So far about $600,000 of stock is said to have been subscribed.

The newly organized Monongahela Iron & Steel Co., of Pittsburgh, Pa., which concern is building a plant at Hays Station, near that city, for the manufacture of muck bar, will apply for a charter in August. The incorporators are R. A. Carter, Robert G. McKillon, Robert McDonald and Percie Preston and others.

The Benjamin Atha & Illingworth Co., of Newark, N. J., has begun the erection of a new foundry for steel castings. The new foundry will be equipped with Ridgway cranes of 28-ft. mast, 23-ft. radius, 10-ft. lift and 6 tons capacity. The firm expects to have the new foundry in operation in about six weeks.

The Londonderry Iron Co., Ltd., Londonderry, N. C., has put in operation a new blast furnace of large capacity. New ore kilns of a daily capacity of 100 tons and gas producers just completed are now in operation.

J. T. Ambrose, H. T. Cooper and others have recently incorporated the Cedar Mountain Iron & Steel Co. for the purpose of erecting iron and steel plant. J. T. Ambrose is Manager. The capital stock is $200,000.

Henry H. Cust, has been elected Secretary of the Springfield Iron Co., of Springfield, Ill., to succeed Franklin Ridgely, resigned.

The Johnson Steel Rail Co., of Johnstown, Pa., will erect a large new machine shop and roll mill 365 × 50 ft. Work on the new machine shop located near the switch works is also being pushed forward.

The Rail Market.

Steel Rails.—There is no change in the market to record. The *Iron Age* gives the report of the Board of Control of shipments of standard sections of rails up to July 1, as 454,423 tons, and orders booked up to July 1 aggregate 808,910 tons, showing that during the month of June the sales by all the mills aggregated only 73,000 tons. The market remains steady at $30.75@$31.

Old Rails.—Quotations are: At Chicago, $23@$23.50 for old iron rails, and $14@$16.50 for old steel rails; at New York $21.50 for old iron rails, and at Pittsburgh $23 for old iron and $17.50@$18.50 for old steel rails.

Mining Statistics.

Dr. David T. Day, lately the editor of the apparently suspended "Mineral Resources of the United States" which was issued by the Geological Survey, and now a special census agent in charge of mining statistics, has finished his report, which will soon be printed.

It shows that the total value of the mineral products of the United States at the Eleventh Census amounted to $566,988,450, the greatest total ever reported for any country. The total number of industrial mining establishments is given as 30,000. The number of persons who find employment in mining industry is 512,114. The annual wages paid them aggregate $212,409,809. The capital employed in actual mining operations amounts to $1,173,000,000.

The value of the mineral products of the United Kingdom was (reducing pounds sterling at the rate of $4.88) $358,562,880 for the calendar year 1889 and $452,837,067 for 1890. The British returns not only show the amounts of ore raised and their values, but also the metals obtained by smelting domestic ores. The following are the figures for coal, iron ore and pig iron for the two past years:

	1889		1890	
	Production. Tons.	Value.	Production. Tons.	Value.
Coal	176,916,724	£56,175,426	181,614,288	£74,953,997
Iron ore	14,546,105	3,848,268	13,780,767	3,926,445
Pig iron	5,181,733	12,695,246	4,848,748	14,808,884

That is, in 1889, 62.94 per cent. of the British pig iron product was from domestic ores, and in 1890 61.38 per cent. The iron ore, however, cost $1.39 in 1890, as against $1.29 in 1889. The cost of the iron ore was 30.31 per cent. of the value of the pig iron produced from it in 1889, and 26 59 per cent. of that value in 1890. This, however, was not all profit, as coal advanced from $1.547 to $2.014.

The Manchester Ship Canal.

The lower 3¼ miles of this canal, from Eastham to above Ellesmere, is opened to traffic. The first flotilla of boats passed through it on July 16. The proposition of the city authorities of Manchester to lend the canal £3,000,000 at 4¼ per cent. upon debentures, which had passed the Commons, came up before a committee of the Lords, where the representatives of the railroad companies, as ratepayers in Manchester, protested against "the rates being used to introduce competitors to trade against them" so successfully that a clause was introduced to exempt them "in respect to their running lines from three-fourths of any extra rating which may have to be imposed through this loan." The amended bill was reported to the Commons.

In the course of the proceedings Mr. Leader Williams, the canal company's engineer, stated that 76 per cent. of the whole works were now completed, and Mr. Punber, Q. C., he who referred to Captain Eads, whose advice led to changing the location of the canal, as an engineer from the Wild and Woolly West, argued that the capital now invested in the canal should not be destroyed "in the interests of a few wealthy railway companies, whose monopoly it was the very object of the canal to get rid of." But this appeal to the committee does not seem to have been entirely effective.

Rapid Steel Making.

On the night of July 6 the second turn in the converting department of the Edgar Thomson Steel Works, of Carnegie Bros. & Co., Ltd., at Braddock, Pa., made 60 heats and turned out 930 tons of steel. The best previous record in one turn was 850 tons.—*Iron Age.*

The Baltic North Sea Canal.

Work on this canal is said by the *Iron and Steel Trades Journal* to be progressing favorably, and it is hoped to have it opened for navigation during 1895. The plant employed comprises about 30 dredgers and 27 excavators, 90 locomotives, 2,700 cars for the transport of earth, 72 lighters, etc. The total excavation is estimated at 100,000,000 cu. yds., and the Elbe sluices will require some 40,000,000 brick, besides granite.

THE SCRAP HEAP.

Notes.

A Sacramento dispatch of July 17 says that nearly 3 miles of snow sheds on the line of the Central Pacific near the summit of the Sierra Nevada Mountains were burned on that day.

Supt. Stedwell, of the Cleveland division of the Cleveland, Cincinnati, Chicago & St. Louis, has directed that oil cars be placed 10 car lengths back of the engine and four from the caboose.

Post-office officials have arrested 7 men near Gadsden, Ala., for wrecking and attempting to rob a mail train at Springville, Ala., on the Alabama Great Southern, April 20. Two postal clerks were injured in the wreck.

The temporary trestle of a new bridge of the Pittsburg, Cincinnati, Chicago & St. Louis across Cork's run, six miles below Pittsburg, was washed away by a sudden flood last Saturday and three workmen drowned.

The Pennsylvania has lately made its periodical test of employés' eyesight. Out of the 712 men tested on the Indianapolis Division, none were found with eyesight sufficiently impaired to incapacitate them for the positions they hold.

The collision on the Chicago & Erie at Hepburn, O., July 17, which was reported to have killed 9 employés, was a very light one, no person being hurt. A heavy freight train approached the station at unduly high speed and ran into a work train.

Thirty-five mechanics were discharged from the shops of the Long Island Railroad at Morris Park, N. Y., last week because they had sent a written petition to the President of the road asking for the removal of Charles Thompson, the Master Mechanic.

The New York Central has ordered the discontinuance of the sale of travelers' insurance companies' policies by its agents at all the stations along the line. It appears that a contract has been made with the Fidelity & Casualty Co., of New York, whose travelers' insurance tickets are purveyed by means of automatic machines.

The new screw ferryboat of the New York, Lake Erie & Western crashed into the slip at Jersey City on the morning of July 17 at full speed, the signaling apparatus between the pilot-house and engine-room having failed to act. No person was hurt, and the boat suffered scarcely any damage; but the bridge and much of the flooring back of it was badly crushed.

Foreign Notes.

The strike of railroad employés in France threatened last week did not amount to much, although a few hundred men suspended work for a short time.

Owing to the fall of the Mönchenstein Bridge, in Switzerland, referred to in last week's issue of the *Railroad Gazette*, the direct communication between Paris and Vienna by way of Belfort and Basle was interrupted and passengers from Paris to Basle and to points beyond had to go by way of Mülhausen in Alsace. In order to avoid irritating delays and complications the passport regulations, so far as such passengers were concerned, were suspended.

On one of the railroad tracks of the Manchester Ship Canal, July 18, a gravel train derailed by a misplaced switch was overturned, and several of the cars were thrown over an embankment, killing 11 men who were at work at the foot of the bank. The switchman who made the blunder was 17 years old, and was arrested on a charge of manslaughter.

The city of Bremen will probably soon enjoy the distinction of being the first German city in which horses will have been wholly supplanted by electric power for street-car service. A portion of the Bremen street-car system has been worked electrically for some time, having been equipped by the Thomson-Houston Co. At present, however, arrangements are being made with this company to fit up the whole Bremen system on its principle. At Gera the Sprague system is in use.

Hydraulic buffers for railroad use were made the subject of an interesting paper recently read by Mr. Wilhelm before the *Verein Deutscher Maschinen Ingenieure*, and reprinted from *Glaser's Annalen* for July 1. Illustrations were given of several English and German buffer stops, prominent among the latter being those designed by C. Hoppe, of Berlin, for the railroad station at Potsdam. An account is also given of tests made with the apparatus, falling weights being used to simulate the impact of a train running at a speed of about 9 miles per hour.

Since the French ministerial decree of 1884 that the daily period of service of switchmen on French railroads should not exceed 12 hours, constant efforts have been made to properly restrict also the hours of engineers and firemen. Careful investigation has shown that the daily length of service of these employés exceeds all reasonable limits, and the Minister of Public Works has accordingly requested the railroad companies to adopt arrangements which will bring the working time of these men to not more than 12 out of 24 consecutive hours, including the delays before departure and after the arrival of trains, and which will permit the men to return to their homes as often as possible while off duty.

The St. Gothard Railroad recently purchased some large locomotives from the Maffei Works, at Munich, and has also added a number of new express locomotives designed for a speed of 51 miles an hour. Two hundred iron coal cars of 15 tons capacity, have been bought, and some new sleeping-cars have been put in service under special arrangement with the Swiss Central Railroad and the Brussels Sleeping-Car Co. It is said that the car bodies and interior furnishings came from the United States. The Goliath rail, weighing 46.4 kg. per mile (about 93 lbs. per yard), is now being laid on the surface lines, and on the tunnel section a rail weighing 48.5 kg. per metre (97½ lbs. per yard).

In a paper, giving notes on English and Belgian railroads, recently read by the well-known German railroad engineer, Mr. Von Borries, before the Society of German Engineers, it is pointed out that for a long term of years the Belgian state railroads have used nothing but dust coal in their locomotives, the grate areas of the older engines ranging between 2½ and 3 square metres (about 27 and 32 sq. ft.), and the grate bars being closely spaced. Owing to the increased train loads, however, and the demands for higher speed, the newer locomotives have been given grate areas of about 5 sq. m. (about 54 sq. ft.) Thin fires are maintained, and the coal dust is used in a pretty wet condition, being introduced in comparatively small quantities at a time. There is said to be no difficulty in making steam, and the fire-boxes last from 10 to 12 years, during which time the tube sheets are generally removed once. Leaky tube ends are said to be unknown. In the newer locomotives the forward axle boxes are of the radial type and give little satisfaction, imparting a jerky, unsteady motion to the engine.

RAILROAD GAZETTE

Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

There is renewed activity among electric motor companies in matters pertaining to large motors for heavy work, such as switching freight in cities where smoke is objectionable, and for elevated roads. Two of the largest companies believe that they have solved the problem, and one of them will at once build a motor with a capacity ranging from 500 to 700 H. P. and a hauling power equal to any steam locomotive with 45,000 lbs. on the drivers. This has been rendered practicable by recent improvements in motors, of which the slow-moving armature and the subdivided field are probably the most useful for heavy work. Railroads in such cities as Chicago, where a city ordinance prohibits the use of locomotives that emit smoke in any considerable amount, are now compelled to use a non-smoking fuel, such as coke or anthracite, or put on a device for preventing the formation of smoke, the action of which is acceptable to the city inspector. As such devices are more or less ineffective, even in their best form, it has been found necessary on at least two Chicago roads to resort to anthracite coal, at a cost of $4 to $4.50 per ton on tender, to meet the requirements of the law. Where steam costs at this rate it cannot be difficult to construct an electric motor which will work with at least equal economy, as cheap coal can be used in the stationary plant which furnishes the electric current. With such advantageous conditions, the difficulties in the way of the use of the electric motor for suburban work are mainly in the mechanical devices in the motor itself and the arrangement of the conductors. The electric companies feel sure that they have now removed all these difficulties, and they will make a trial of a heavy motor to prove what can be done. When the railroads of this country are assured that an electric motor of sufficient power to switch trains at terminals and to haul suburban traffic can be built of as simple design as those now used for street railroads, and can be run with reasonable economy of fuel, there will be no lack of opportunities for trial on a large scale.

A signal should be thrown back to danger as soon as possible after it has been used. The train order signal at Ravenna, O., showed white at the time the passenger train was run into on the morning of July 3, although the engine of the passenger train had passed it; and the engineer and other men on the freight set up this fact as one of the points in their defense. They saw this all-clear signal before they saw either the tail-lights on the passenger car or the lantern in the hand of the brakeman. (The State Railroad Inspector says this brakeman got back 800 ft.) It will be recalled that a similar defense was offered by the men on the engine which killed 66 people at Mud Run, Pa., in 1888. Without stopping now to discuss the degree of disingenuousness in this argument or the convincing nature of the evidence that the engineer of train 82 at Ravenna was exceedingly careless, whatever may have been the mitigating circumstances surrounding him, this case should be carefully noted as being an additional illustration of the correctness of the principle given in the opening words of this paragraph. All signals are erected on the supposition that the enginemen, who are to be guided by them, shall see them before reaching the signal post; and no one thinks of employing, even to the slightest extent, the absurd requirement that the runner shall look to a signal for an indication after he has passed it. This being so, what reason exists for keeping a signal in the clear position after the engine has passed it? If the Ravenna signal had shown red it *might* have caused some of the freight trainmen to put forth greater exertions, or to more promptly exert themselves, to stop the train, and it certainly would have left them with one less excuse for their carelessness. In block signaling the custom has grown up of waiting until the whole train has passed 300 ft. beyond a signal before restoring it to the danger position, in order to guard against letting a second train into a block section before the first has wholly cleared it, and the custom has been adopted elsewhere; but it has little warrant in any situation. In block signaling the 300-ft. interval is supposed to take the place of the protection afforded by a distant signal, but it is illogical and makes discipline harder rather than easier to maintain. In yards where interlocked signals are numerous and where short trains are constantly following each other, it is often absolutely necessary to put a signal to danger immediately after the engineman has accepted and used it, in order to stop the following train; if signalmen can be depended upon to do this, why cannot block operators be trained to put signals promptly to danger, while yet waiting for the tail of the train to pass before sending permission to admit the next following train? The theory that the conductor of a long freight (riding in the caboose) should see a train-order signal (or block signal) and know that it is clear for his train, deserves little consideration, for the only consistent rule is to stop the train before any portion of it passes the signal (if the latter is in the danger position); and how can we make the conductor do this? If he is to check the engineman in sighting signals he should ride on the front part of the train, and if he is to ride at the rear the fireman should be the man to aid in keeping the lookout at the front.

The ninth death resulting from the Aspen Junction collision occurred July 13. Such further particulars as have reached us give no additional light on the causes of the disaster. It is to be noted that the immediate cause of the collision is one which would not have operated had interlocked signals, arranged according to the best principles, been in use. But it is not for us to say that a road in the wilds of the Rocky Mountains must be equipped with the most elaborate and costly appliances, the example of Great Britain, requiring the poorest passenger roads to conform to the highest standards, notwithstanding. But Eastern roads, or those in any locality, whose traffic and earnings do warrant the introduction of such safety appliances as fixed signals, thoroughly interlocked, will doubtless observe the obvious moral of this case, that the killing of a half score of passengers by the breaking of a poorly designed check valve would be much more inexcusable on their lines than on one enjoying only a thin traffic. The danger generally comes, not from lack of a single precaution, but from the possibilities that result from neglect of several at once. The use of unsafe check valves is bad enough, but a road properly signaled would nevertheless have escaped this disaster, no doubt; on the other hand, if the engine had had the safest fittings it could have bumped the passenger car quite seriously and yet have avoided the world-wide notoriety that it now has. The correlative value of brakes and signals illustrates this point. The English do without brakes on freight cars, but their block system, with distant signals, saves them. We ignore the benefits of the block system but have got along tolerably well by using better brakes. Our worst disasters come from disregarding *both* the block system and the best brake power. Many of the smaller roads in the East have carried passengers for forty or fifty years with no better signal appliances and regulations than the Colorado Midland uses; but with "slow" appliances they have stuck to slow methods. Freight trains have had to give passenger trains a wide berth. The "margin of safety" has practically been about the same as that on larger roads, which, though they have adopted better appliances, have increased the speed, weight or frequency of their trains even faster than they improved the safeguards. When a road uses heavy engines and heavy cars, makes fast time and allows small lee-way at meeting points, but does *not* adopt the well-known concomitant safeguards, it simply reduces the margin of safety to a dangerous degree; but no one seems to see the danger till it is made manifest by fatal results.

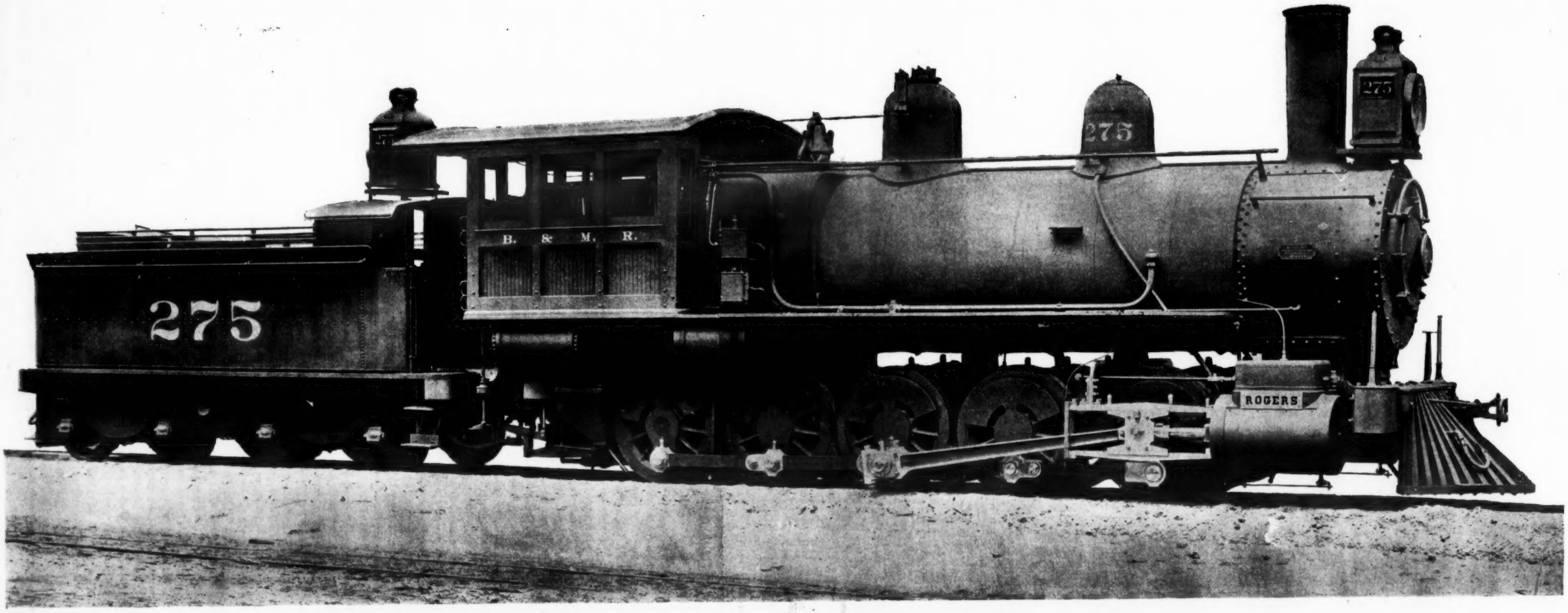
A correspondent calls our attention to the fact that the Aspen Junction collision has been made the occasion of editorials in certain daily papers, which proceed to argue on the lines pursued by certain parties at the time of the New York tunnel disaster—to wit, that the danger of continuous heating systems in passenger cars is illustrated by this disaster. We cannot believe that such utterances have appeared in journals whose opinions have any weight, or that it is necessary to refute them at any length; certainly not to readers of the *Railroad Gazette*. There is a portion of the reading public which, with some editors, makes no distinction between a stream of hot water at 360 deg. F. rushing out of an opening below the water line of a locomotive boiler, and the comparatively harmless jet of dry steam which would issue from a steam heating pipe in a passenger car if it were broken in a wreck; or between an enormous supply, as at Aspen, where the jet continued for four or five minutes of a pressure of 120 lbs. or more per sq. in., and the conditions in a passenger car where a maximum pressure of 30 lbs., rapidly diminishing, represents the utmost possibility of danger; but it is useless to argue with such people.

The Farmers and the Railroads.

Whatever the prospects of the Farmers' Alliance as viewed generally, taking the country as a whole, there can be no doubt that there is sufficient activity among many of its elements to keep railroad men more or less stirred up in various localities for some time to come. Last week we reported some of the recent manifestations in Texas. Georgia is another state where the people are practically all farmers, and where the terrors of the heated term have no deterrent effect on people who talk. The legislature is now in session and the usual two-cent fare bills and other schemes for "getting even" with the railroads are proposed.

Since the days of the old Granger movement no meetings of farmers have been held without introducing into the resolutions or speeches some denunciation of railroad extortion. When such movements are widespread and important enough to take on the character of a new political party, there usually appears some reference to national ownership of all transportation facilities. Students of our political system have been for some time at a loss how to deal with this special hostility to railroads on the part of farmers. The real reason for it has probably little to do with unfairness of transportation charges as compared with the prices paid by farmers for articles bought at stores—as, for example, binding twine—but is to be explained on the familiar theory that when a dog is mad he bites the first person directly in his way. That is to say, when for reasons somewhat obscure and difficult to trace out in detail it comes about that the prices received by the producers for farm products are so low as not to leave an ordinary profit, the farmer casts about in his mind for the cause and a remedy. Amount of acreage under cultivation, overproduction, world's supply and similar things occur to him indeed, but make only a vague impression. In the same way particular persons, such as the commission merchants he sells to, come into his mind, but these are small in number and comparatively helpless to fix prices. But on two sides of his farm runs a railroad. He sees elegant passenger trains go thundering by: he knows that engine-runners and trainmen get good wages and forgets that these men must pay for vegetables which he, the producer, gets almost free; he hears that the bonds and stocks get large returns; a sense of the comparative inequality and poverty of his own lot makes him angry, and, as in the case of the mad dog, this most prominent object receives the first bite.

In so far as railroads have wronged individuals or the public, it is proper that the evil should be corrected, but against the mad and unreasoning onslaught upon carriers in general we must trust to time and education. Time generally brings around a fair degree of prosperity to the great farming industry, and a fair profit on farm products goes a great way toward soothing an imaginary wrong. It is, moreover, more than probable that we are entering upon an era, perhaps of many years' duration, wherein prices for the staples will rule higher than in the past. Careful computations show that in the matter of wheat the world's consumption is increasing faster than production, and that not only in the present year, but for succeeding years, farmers will probably receive fair prices for



SEVENTY-FIVE-TON DECAPOD LOCOMOTIVE FOR THE NEBRASKA LINES OF THE CHICAGO, BURLINGTON & QUINCY RAILROAD.

Built by

THE ROGERS LOCOMOTIVE & MACHINE WORKS, *Paterson, N. J.*

that grain. Time, therefore, will tell strongly against the unfair aggressions of the Farmers' Alliance upon the railroads and in favor of fairness in regulation by government.

The whole discussion is a "campaign of education" which railroads must undertake, as the price of corporate prosperity and even safety. Many railroad charges in Texas have, on the face of them, a queer look, and some cannot be defended except by saying that all competing roads would not agree to a change; and yet Texas managers and stockholders can rest easy in the full assurance that Senator Reagan and his Commission the more they study the problem and the more they learn about the conflicting interests of towns and shippers will come around at last to recognize the rough justice of the present basis of rates, even though details may be changed. For example, the Texas Commission asks why one town twice as far from the Gulf as another is not charged twice the tariff, remarking that "everybody knows that it costs more to haul freight a longer distance." Whereupon a prominent merchant in one of the cities in middle Texas writes a letter, calling for a mass meeting of citizens to protest against equal mileage rates, because, under that theory, St. Louis and the Gulf ports would take the trade away from the interior towns, as they certainly would. The Texas Commission will get itself informed on these questions before it is done, and will find that what seems perfectly clear to an outsider is in reality a complicated affair.

But, meantime, under the stress of the Alliance demands, and during the time of the educational campaign, the railroads must expect to endure some minor hardships. It is possible, too, for them to learn something from the citizens and their representatives. For example: the rate on sugar from New York to Chattanooga has been cut to 19 cents, while to Atlanta the old rate of 33 cents is still maintained. Of course the Atlanta roads are not responsible for the cut to Chattanooga; 33 cents is fair of itself; the Atlanta lines are entitled to a profit. But these and other well-known arguments do not alter the stubborn fact that the two cities are but 140 miles apart, and that the Chattanooga wholesale merchants can undersell the Atlanta men throughout the whole of this mutual territory. It will not do for railroad managers to assume that they are always right and all shippers merely selfish and anxious for an unfair advantage over somebody else. But as before remarked, the Alliance movement must have its effect. In Georgia the Commission reduced the local rates on coal, whereupon the roads advanced the interstate rates to meet the difference. The Commissioners now call for a hearing, but say in advance that it is a matter of form, because they are determined to reduce the local tariffs again to correspond with the recent advance in through rates. And this in spite of the fact that Atlanta gets her soft coal much cheaper than does Baltimore or any Northern city.

The truth is that the Southern roads must expect trouble for some time to come; the Alliance there will, unless signs fail, last longer than in the West and Northwest, because prices of cotton which Southern farmers sell are low, while prices of meat and of corn, which they buy, are high. Southern farmers unfortunately rely upon cotton, and consequently are subject to the misfortunes to which all one-crop countries and railroads are subject.

Good and Bad Steel Castings.

We have at divers times called attention to the variations in quality to be found in different steel castings from the same makers and the need of a rigid inspection to weed out those which are unworthy of use. The importance of this subject needs no explanation, and we give on this page, as an illustration of the irregularity and the extremes of quality which obtain in steel castings, three cuts of two different steel drawbar knuckle castings identical in shape. One of these, fig. 1, is about as bad as a steel casting can be made, and the other, figs. 2 and 3, is one of the best. Such castings as fig. 1 have furnished the basis for the opinions of those who have held that steel in castings is unreliable. This cut was made from a photograph of a knuckle broken in service, and the only evidence of its badness that is to be found on the part of it which is unbroken is the presence of fine pin holes quite evenly distributed over the surface. This knuckle only weighs about two-thirds as much as a sound knuckle, like figs. 2 and 3, when made from the same pattern, on account of its porosity. It cannot be denied that there are a great many knuckles like this in service now, and they continue to afford ground for a lack of confidence in steel couplers. These poor castings were not used purposely by coupler manufacturers to save cost, but were passed into service unwittingly on account of there having been no proper method of inspection; but of course the steel-makers knew the character of the steel they were furnishing to the coupler manufacturers and they are really responsible for whatever there is or has been of this bad stock floating about on our freight cars. Much of this poor material which was put in service 12 months ago has already found a place in the scrap heap. It is hardly to be wondered at that we have had so many broken knuckles nor that some roads demand forgings instead of castings.

But the number of steel casting firms is increasing, the character of the average product is improving, and the price per pound has decreased considerably of late. This indicates that steel castings will come into general use in the next few years, and there will naturally be an increasing need of some simple mode of inspection that will indicate readily the exact nature of the material and, especially, is solidity. Not a few mechanics have heretofore looked upon this material as being too uneven and unreliable to be really useful for important work, but they must now grant that a great improvement has been made. Proof that good, sound steel is now produced is given by the cuts, figs. 2 and 3, which are photographic reproductions from a print made directly from a knuckle which was sawed into parts and then polished and etched with acid. This casting is practically sound throughout and is tough and strong. The metal between the cells in fig. 1 is of a good quality, and, if it were solid, would make a perfectly safe casting to use. Holes in steel castings do not indicate bad stock, but they do show the result of bad molding, bad heating and poor arrangement of gates and risers on the castings. In using almost pure steel without a flux or "physic" there is but little margin in which to work and not produce porous castings, and it is also difficult to determine beforehand what the nature of the interior of any given casting will be when made. Hence in order to give greater margin for the workmen and to furnish greater certainty of results, it is now common practice to use an admixture of silicon, manganese or aluminum to reduce the melting point, to increase the fluidity and to assist in producing sound castings, principally by allowing the bubbles of air and gas to escape instead of congealing in the castings, as was the case in the knuckle shown by fig. 1.

The physical properties of steel castings vary with the composition, and it is impossible to state definitely what the material is without a test, even when the composition is known. The tensile strength ranges from 55,000 lbs. to 90,000 lbs. per sq. in., according to the percentages of the above ingredients. If too much "physic" is used the castings are quite solid, but brittle and usually have considerably reduced tensile strength and elongation. It is better, however, to use enough to make sound castings rather than try to get a fine, high-grade quality of steel at the expense of solidity. Of the three "physics" generally used probably silicon is most favored by a majority of steel makers, yet in a paper before the American Institute of Mining Engineers Prof. Langley stated that "the action of aluminum is about twenty times as powerful as that of silicon, and the resulting steel is tougher and sounder than when silicon is used." This paper treats further of the value of aluminum, and those who are interested in the subject will find it worth reading. Even with a considerable percentage of the above-mentioned ingredients steel castings are vastly superior to malleable or cast iron castings for use where the parts are subjected to blows and shocks; but the ratios of their respective value have not been determined. The latest information on this point is that presented by the Committee on Pressed Steel and Malleable Iron, in their report to the Master Car Builders' Association of this year. There it was shown that steel castings of ordinary quality have twice the strength of malleable iron and three times that of cast iron, and five times as great elongation and ductility as malleable iron. From this it appears that even common grades of steel castings, if sound, are much superior to the best brands of malleable iron for general castings; and for equal strength, parts made of steel castings can be at least one-third lighter, and in many cases one-half lighter.

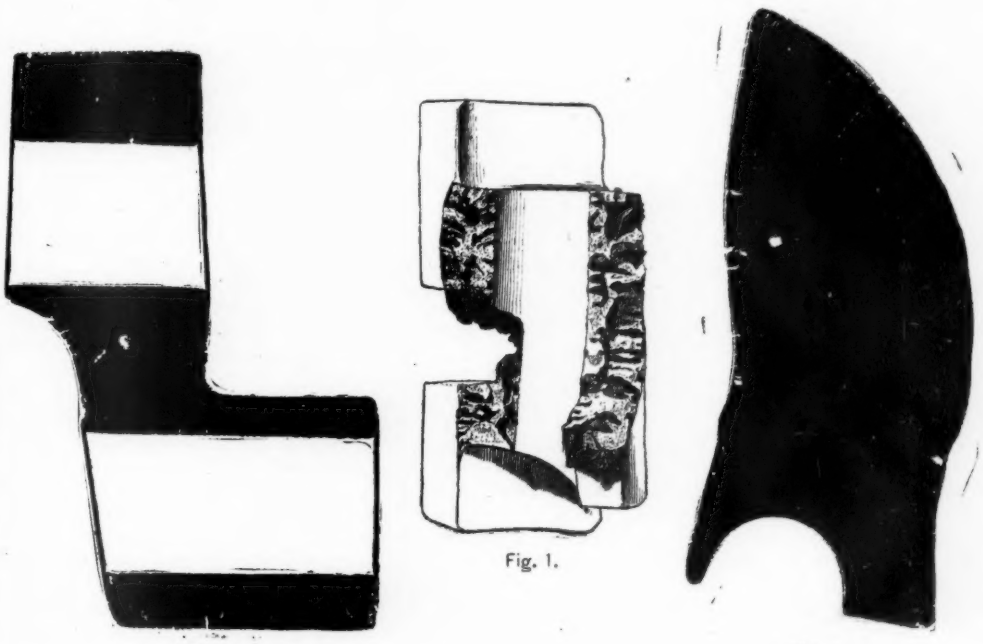


Fig. 2. Fig. 1. Fig. 3.

GOOD AND BAD STEEL CASTINGS.

Mr. Gantt's paper on steel castings presented at the Providence meeting of the American Society of Mechanical Engineers contains much interesting data on the preparation of molds and patterns, and shows that the effect of annealing is to increase the elongation from 22 to 31 per cent., accompanied by a slight decrease in tensile strength. Samples of perfectly sound steel castings were shown at the recent Cape May conventions, and we find in many shops unlimited proof of the possibility of casting steel in any reasonable form free from blowholes. It is therefore safe to say that one can purchase from any one of a number of steelmakers solid steel castings varying in ultimate strength from 55,000 lbs. to 90,000 lbs. per sq. in. at a comparatively low cost. Prices are generally falling, and, for equal strength, steel castings now probably cost less than castings of any other material. This advance in the manufacture of steel does not mean, however, that it is as yet so far perfected that it has become a general substitute for malleable iron, and there is and will remain for a long time a large class of castings which cannot be made successfully in steel, and which are perfectly satisfactory in malleable iron. The most attractive field for the steelmakers at present is railroad work, and in this the M. C. B. coupler is the most prominent single article. It weighs enough to permit a large daily tonnage to be melted, and the selling price is sufficiently high to enable a good manufacturing profit to be made. Nearly all of the steelmakers are taking up this class of work, and six or seven coupler companies have made or are making contracts for steel bars. When made of steel they weigh about 180 lbs., instead of 208 lbs. as when made of malleable iron, and by actual tests the steel bars have considerably greater tensile strength and much greater resistance to blows, as was hinted at in the report of the committee above referred to.

In testing and inspecting steel castings there should always be a chemical analysis made. This will indicate what may be expected of the steel in a physical

test, and will point out the necessary tests to be made. The castings should each and all be weighed separately, and any individual casting which falls more than two or three per cent. below the average weight of those known to be solid ought to be rejected as unsound, as it will in most cases be found to have large blowholes or be generally porous. If steel castings have the proper composition and correct weight, and pass the hammering or drop test, the examination for shrinkage cracks in corners and for crookedness resulting from annealing, one may be sure that the product is uniformly good. If still greater certainty is desired, then a whole casting, if small, or parts of it if large, should be pulled in a testing machine. This will give the tensile strength and elongation. But in most ordinary cases a steam-hammer test, coupled with the chemical analysis and exact weighing, will give a sufficiently correct knowledge of the value. In view of the present difficulty of getting steel castings in large quantities, and of the increasing demand for them, as well as the constant improvement in the quality of the material, we should welcome the continued increase in the number of steel making plants in this country.

Locomotives Specially Designed for Steep Grades.

In another column will be found a description of a new standard "hill" engine for the Chicago, Burlington & Quincy, and a half-tone picture of the same is given on the inset. This engine is an excellent example of a machine designed for use as a helper or "pusher," and nothing else, and we take the opportunity to again call attention to the peculiar conditions under which such engines operate, as was shown in the *Railroad Gazette* of Dec. 19, last year. The life of such a locomotive as this is practically spent climbing a steep grade, pushing or pulling a heavy train with all the force which the weight on the drivers will permit without slipping. On reaching the top of the hill it glides down without steam, under control of the driver and tender brakes. A little reflection will show how different such work is from ordinary road service. The road engine usually has to mount short, heavy grades at various points, and at such places needs to exercise its entire hauling capacity, but during a majority of the time of action only a fraction of the total power is needed. If two similar engines are put, one into hill service and the other into road service, the average cut-off in the two must be widely different, for the mean effective pressure must be nearly in proportion to the hauling force exerted, aad this is about as ¼ or ½ to 1. All who have studied engine economy know that a change in cut-off is always followed by a change in economy. There is a point of most economical cut-off, and to vary either way from that is to lose in efficiency. If this is granted, then there will be no dispute as to the existence of a difference in the economy of two similar engines put in the different classes of service.

Now, it has been claimed by some who have granted these premises that the cost of coal is such a small fraction of the train expenses where two engines are employed that the possible saving in fuel by making hill engines different from road engines would be so small as to make it not worth while to go to any considerable trouble to accomplish it. Better give your attention to saving wages, say these people. But without stopping to get them to explain how the use of small cylinders will assist in reducing runners' or firemen's wages, we may answer that the old and obvious principle that a penny saved is always valuable, applies here. Furthermore, although extravagance in the use of fuel may be partially warranted where railroad companies own coal mines and can put fuel on tenders for less than a dollar a ton, it is not justifiable in a service like that in which the Burlington decapod is to be used. In this case coal costs $6 a ton on the tender and the entire wages of both the engineer and fireman can be readily saved or the same amount lost by altering the proportions of the vital parts of the engine. These conditions obtain in hundreds of cases.

But there is one point which affects all roads alike, regardless of the cost of fuel, and that is boiler repairs. This has not been well considered by those who refuse to look upon hill engines as requiring special treatment in design. Coal may perhaps be mined for a song and wasted without loss, but repairs to locomotive boilers cannot be had for the asking, and new fireboxes, tubes and grates cannot be dug from a hillside with a shovel and pick. Forcing a boiler always increases the expense for repairs, as every one knows from experience. The conditions under which nearly all locomotive boilers have to work, as compared with stationary boilers, illustrate this every day. Is it then advisable to design an angine so that the fire box must constantly carry a fire 30 to 50 per cent. stronger than is necessary and the water supply be drawn upon for that much more water than is actually needed to do the work? A given amount of scale will be deposited from a given amount of water, and a decrease in the water evaporated in a given time will produce nearly a proportionate amount of decrease in the scale deposited; hence putting less work on a boiler is to decrease the amount of scale deposited in a given time, so that even where coal costs next to nothing there is a considerable advantage in reducing the water used per ton mile.

It may possibly be said that the designers of this decapod did not appreciate these points; but that is not so. They were fully alive to the advantages to be obtained by making locomotives for the service in which they are to be put. This is made evident by the fact that these engines have a greater cylinder capacity, and therefore greater expansion, in proportion to the weight on the drivers and the diameter of drivers, than the company's regular road engines. The difference is as follows:

Class "H"—Ratio of cylinder volmue multiplied by boiler pressure to weight on drivers multiplied by diameter of drivers =	.194 to 1
Decapods—Ratio of cylinder volume multiplied by boiler pressure to weight on drivers multiplied by diameter of drivers =	.227 to 1

This increase gives considerably greater expansion in the decapods than in the class "H" when the full weights on drivers of both engines are being utilized to haul a load up a hill. This increased expansion must give greater economy. With the class "H" the admission of steam must be prolonged to about full stroke in order to use the entire adhesion, that is, to slip the wheels; and the cylinder would then be working without expansion, and would be no more economical than an old-fashioned steam pump or the earliest and crudest forms of steam engines. In the case of the class "H" in regular service, however, there is so little demand for the exercise of full hauling power—seldom except at starting—that the economy is excellent and the loss during the periods of exertion of full hauling capacity is too small a percentage to affect the average economy. As shown by actual indicator cards the class "H" in its regular work expands steam from three to four times, which is nearly if not quite all that it is economical to do in one cylinder. If the class "H" should be put into hill service the result would be a very uneconomical engine, with a tendency toward wrecked fireboxes, burned grates and heavy scale deposits when using bad water; whereas the same engine with larger cylinders or with compound cylinders, or any other change which would give greater expansion of the steam produced by the boiler, would be as economical and as little destructive to parts as the class "H" now in its regular service.

But while there may be room for discussion as to whether the cylinders on the new decapods are sufficiently large to give all the expansion that is desirable, we can safely say that the change to a greater ratio of cylinder power to the moment of weight on drivers is a decided step in the right direction, and one which leads up to an appreciation of the large saving so easily obtained with the compound locomotive when put into hill service.

We are of course aware of the incidental troubles of large cylinders on simple engines, such as an increased tendency to slipping, but they are small compared to the possible saving in fuel and repairs that we have pointed out; and once let the management of a road that is paying high prices for coal (as in the Western States) fully appreciate the money value of the saving due to the use of larger cylinders for pushing engines, and the complaints about slipping will quickly disappear. This evil all depends upon the watchfulness of the engine runner, and his attention is dependent upon the enthusiasm of the local master mechanic, whose interest, in turn, can be mightily affected by a little stirring up from headquarters. The cost of the steel ground off the tires by slipping is small indeed, and the cost of tire renewals is also small of itself; yet if officers will follow the ridiculously arbitrary rule in force on some roads of making tire-turning a signal for a gang of men to spring upon the engine and overhaul the whole machine, whether it is necessary to do so or not, then the cost of each sixteenth of an inch of a tire may be estimated (as we have sometimes seen it) at any sum, from its true value to a cost that is absurd on its face. So we might proceed through the whole category of objections to larger cylinders for hill engines, and in each case reach the same conclusion—that no real obstacle exists to making engines which are to act as pushers on heavy grades strictly according to the well established principlef of steam engineering.

These considerations naturally lead up to a discussion of how to compound these decapods, and where to put the large cylinders that would be necessary; whether to use two, three or four cylinders, tandem or side by side, the best cylinder ratios, etc., all of which are problems which must be solved before many months have passed over the heads of our locomotive builders.

Our Pig-Iron and Steel Production for the Half Year.

From the "Bulletin of the American Iron and Steel Association" we learn that our production of pig iron for the first half of this year was only 3,371,925 gross tons, as against 4,560,513 tons during the corresponding period of last year. And we have to go back to the first half of 1888, when the production was 3,020,092 gross tons, to find anything so small. Comparing 1891 with 1890, the decrease amounts to 1,188,588 gross tons, or about 26 per cent. This one item has probably reduced the freights offered to railroads by some 5,000,000 tons, the larger portion of which would have been long-haul freights. The shutdown in the Mahoning and Shenango valleys apparently accounts for over 330,000 tons of this shortage.

The shrinkage in the production of Bessemer steel ingots, according to Mr. Swank, in the first half of 1891, as compared with the first half of 1890, was over 21 per cent., while the shrinkage in the production of Bessemer steel rails in the same period was nearly 44 per cent. These are very great shrinkages. The wide gap between them, however, again illustrates the growing popularity of Bessemer steel in the production of articles other than rails. The production of Bessemer steel rails in the first half of 1891 was the smallest half yearly production that has taken place since the first half of 1885. It was even smaller than in the second half of that particularly dull year. The reduction in the ingot production in the first half of 1891, as compared with the first half of 1890, was wholly due to the decreased demand for rails.

These figures have been gathered with unusual promptness, and may require slight revision, but there seems no doubt of their substantial correctness. The monthly returns of the *American Manufacturer*, showing the capacity of furnaces in blast, show a theoretical production of 3,460,240 tons, but the probable production was rather less. These returns have not heretofore varied more than about two per cent. from the production as established by Mr. Swank, and in fact they vary by less than three per cent. Why Mr. Weeks should have added over 140,000 tons to a result that every one except himself apparently felt confidence in, and placed the production at 3,600,974 gross tons, or why the *Iron Age* people should have added 50,000 tons to their results, is not apparent.

The prospects for the next six months are much brighter, though it is not expected that our make will equal that of either the first or second half of next year. Our production for June was greater than for any other month of the year; there is every prospect that a very lively demand for freight cars is imminent, and the proposals for lines of mail steamers which the Postmaster-General is just issuing will, if any bids are made, cause a very large demand for iron and steel. Either of these influences would give our iron market a greater boom than the demand which followed the destruction of the Pennsylvania Railroad's tracks at Johnstown gave it in June, 1889. This would greatly intensify the car famine, which seems certain to follow the movement of our grain crops.

Any prediction as to the British make for the first half of this year must be untrustworthy at this writing, but it does not seem probable that the production there has exceeded our own by over one per cent., if it has quite equaled it; and no promise of an increased demand on her markets from either domestic or foreign sources is yet visible. So we shall probably retain the lead in production which we established last year.

Dr. G. P. Conn, of Concord, N. H., Vice-President of the National Association of Railway Surgeons, is the author of a brief article on "Hygienic Conditions of Passenger Cars," which has been issued in a pamphlet, reprinted from the *Weekly Medical Review* Dr. Conn shows an accurate appreciation of the difficulties of the problems connected with heating, ventilating and cleaning passenger cars, and his essay is worth keeping on this account if for no other reason; but he is unable to indicate any new remedy. The principal point in his advice is the old one of thoroughly instructing the men who take care of cars. He speaks first of simple cleanliness as regards the car itself without reference to the atmosphere in it, and lays special stress on the offensive condition of the closets in the majority of passenger cars. He remarks that parlor and sleeping cars are generally better cared for, though he frequently finds the closets in these very disgusting after they have made unusually long runs. In speaking of this class of cars he might also have added that their bad condition is often greatly aggravated in the winter by simple lack of ventilation. Although one of the principal objects that people have in paying extra fare in drawing-room cars is to secure more space and consequently better air, it is a fact that even 25 people in a passenger car will very soon vitiate the air very badly if the ventilators are sufficiently neglected. One of the most offensive whiffs ever "experienced" by the writer's nostrils was that encountered on entering a sleeping car about

four o'clock in the afternoon after it had been running about 20 hours on one of the best lines. The car was only comfortably loaded, but no first-class day car, packed with 75 passengers, ever gave forth a blast more foul.

Dr. Conn reminds his readers that hot water and steam are the best disinfectants, deodorizers and filth destroyers. It is important in washing the wooden parts of cars in cold weather to use very hot water. A jet of steam thrown upon a urinal for a few minutes dissolves the salts deposited upon its surfaces, and steam thrown from a hose under 25 lbs. pressure will destroy the most virulent disease germs in the smallest corners and crevices.

Our attention has been called to a loss suffered by the Intercolonial Railway, in New Brunswick, when its cars receive new wheels on foreign roads. It was intended to bring this point to the attention of the last Master Car Builders' Convention, but the rush of debate on the Interchange Rules at that time prevented it. The following are the facts and figures on the Intercolonial. Doubtless some of our own roads can furnish like proofs of losses in the same way. In the year 1887 the Intercolonial commenced putting in chilled wheels of 620 lbs. weight instead of 520 lbs.; but wheels failing on foreign roads continue to be replaced by 520-lb. wheels, the Intercolonial thus getting no credit for 200 lbs. extra metal in the pair of wheels removed. Wheels failing under foreign cars on the Intercolonial have been replaced with those weighing 620 lbs., nothing being allowed for the additional weight of the wheels put in. The Intercolonial people naturally consider that the rules should be changed, so that the company removing a pair of wheels shall replace it with wheels of the same weight or pay the difference. They would prefer the former, as they believe that the risk of the light wheels breaking under a car with a carrying capacity of 40,000 lbs. is very great. The Intercolonial officers offer as evidence of the advantage of using the 620-lb. wheels the following mileage and consumption report:

"In 1887 we were running 520-lb. wheels almost exclusively. We commenced putting in the heavy wheels the latter part of that year, and as the heavy wheels were put in service the consumption decreased and the mileage increased in a marked degree, as the following table will show:"

Year ending	Car mileage.	New wheels put in.	Average number of miles run for each wheel put in.
June 30, 1887	52,478,770	6,925	7,578
June 30, 1888	57,156,535	5,776	9,895
June 30, 1889	54,977,796	4,728	11,628
June 30, 1890.....	59,661,145	4,360	13,684

The New York Rapid Transit Commission have agreed upon a route for a railroad on the east side of the city, the general plan of which is described as follows:

Diverging from the proposed Broadway line at or near Fourteenth street, thence under Union Square to Fourth avenue, and under Fourth and Park avenues to near and south of 42d street; thence by suitable curve to the westward, under such private property and streets as shall be found practicable to Madison avenue at or near 44th street; thence under Madison avenue to a point near 96th street, thence curving to the eastward to a point not less than 100 ft. east of Madison avenue, thence by viaduct over private property parallel to and not less than 100 ft. east of Madison avenue to a point near 134th street, thence by curve to the eastward and by bridge across Harlem River. The general plan of construction from Broadway to a point near 96th street shall be either by double-deck tunnel with two tracks upon each deck, or four tracks upon the same level, as may be found upon further examination and survey to be most expedient, and as near the surface as shall be found practicable. From near 96th street, north, to be by viaduct with four tracks, to Harlem River. The conditions as to location of stations in tunnel and all appliances connected therewith shall be substantially the same as those required for the proposed West Side line heretofore agreed upon [*Railroad Gazette*, May 29]. The engineers of the Board are to make the necessary surveys, plans and specifications for the East Side line south of the Harlem River at the earliest practicable date. From the Harlem River north the exact location and mode of construction can be determined only by instrumental survey, having due regard to the present sparseness of population and necessary economy of construction, and the engineers have been instructed to make such surveys at the earliest date practicable, but without delaying the preparation of the plans for the line south of Harlem River.

One of the continuation armor-plate tests has just been completed, showing quite satisfactory results and a progressive movement in the right direction. As outlined in our issue of May 22 last, these tests are being carried on for the purposes of ascertaining (1) the right percentage of carbon to be introduced into the plates; (2) whether the plates are best of all steel or of nickel steel, (3) the extent and depth of the tempering and hardening necessary and (4) the nature and construction of the shot best adapted to the destruction of the advanced plates. The latest plates tried are of all-steel, 3 in. thick and of the regulation 6 × 8 ft. face. A less percentage of carbon (.25) than before has been introduced, developing a less brittle plate surface, for the purpose of overcoming objections raised by the results of the previous tests and trials, viz., that of the cracking of the surface by the shot. The new plates were subjected to 14 shots from a six-pounder, rapid-firing Hotchkiss gun at a striking velocity of some 1,800 ft. per second. The projectiles fired were such as would under the same conditions penetrate a 4-in. steel plate of ordinary nature and construction. After the firing the plates were found to be uninjured, but slight indentations appearing where the shots struck. There were no surface cracks, but in each instance the shots were entirely broken up, the pieces being very small. The next stage in the contest is what may be termed the antagonistic stage; the plates are now in quite good defensive condition, the shots or projectiles must next be improved to meet the value of the plates. A number of Carpenter steel projectiles with blunt punch-shaped heads have been ordered, with the expectation of possibly overcoming the tendency of the shots to break up. The next trial will probably be new projectiles against new plates, such contests being kept up until the best attainable approach to perfection in penetration of projectiles and in plates and defensive armor has been reached.

The decision to rebuild some 100 of the old cast-iron bridges on the London, Brighton & South Coast Railroad conveys, says *Ryland's Iron Trade Circular*, good news to bridge builders and steel makers. Not only on account of the demand from the Brighton Railway, but as attention is being called to the bridges on other lines, which are said to be no stronger than those on the Brighton, an enormous demand is likely to be established which "will in a great measure help us to tide over the time which we shall have to wait for the recovery of the South American markets." It also adds that "Mr. Chamberlain is taking up the subject of defective bridges, and will ask the President of the Board of Trade whether he is taking steps to secure the safety of passengers pending the alteration of the condemned bridges on the London, Brighton & South Coast Railway."

In commenting on an article by Sir Thomas C. Farrar in the *Economic Journal* on "Some English Railway Problems of the Next Decade," *Herapath's Journal* says: "We are glad to notice throughout the article that Sir Thomas, with all their faults, likes English railroads best in preference to the red tapeism on the Continent and the huge swindles that have, from time to time, characterized American railroad management." It is true that "huge swindles have from time to time" been an incident of the railroad management of America, as well as of England and the Continent. It is not true that they have been sufficiently frequent to "characterize" the management in this or in any other country; whereas, among the faults of English railroad management is the uniform and ever present one of enormous preliminary charges for promotion and lobbying the charter through Parliament, which, in instances, is nearly as large per mile as the capital account of some American railroads. *Herapath's Journal* is fast losing its character as a fair British critic of corporation management by its loose journalism.

The complicated grade-crossing problem at Buffalo still hangs fire, although the New York Central, it will be remembered, got ready to prosecute a portion of the work two or three months ago. The commisssioners on the part of the city are, however, feeling decidedly encouraged just now over the final conclusion of a contract between the New York Central and the Western New York & Pennsylvania which removes one important element of difficulty. These companies have exchanged certain tracts of land east of the union (Exchange Street) passenger station, and it is understood that the passenger trains of the last-named road will very soon be run into the union station. Competent judges believe that this practically removes all serious objections except those of the New York, Lake Erie & Western officers. That company will inevitably be put to great expense whenever a radical change of grades is made at Buffalo, and has some reasons for hesitancy which are not felt by the other roads with so much force. But the Buffalo people say that public opinion there is so nearly unanimous that the reform must soon go through.

A rather curious practice is followed by some of the Baltimore & Ohio locomotive runners who are noted for making a smooth stop with a passenger train. Just before the train stops, and while the brakes are still on, the throttle is opened and the engine pulls out hard for two or three revolutions; this tends to overcome the high rate of retardation which always occurs at the last part of a stop, and makes the rate of stopping more uniform. The theory of such practice is correct, but it is more common to see runners moderate the rate of retardation at the end of a stop by partially throwing off the brakes at that time, so as to reduce the brake-shoe pressure.

The success of the Chicago & South Side Rapid Transit Co. (the "Alley" elevated road) in obtaining a right of way and building the structure has called the attention of other capitalists to the possibilities of success possessed by other projects of the same sort in Chicago. The result is that there are several projected roads, but they all labor under one difficulty, which is found in the law relating to elevated structures for transportation purposes. It is that a majority of the property holders for the entire line and for each individual mile of the line must give written consent to the building of the structure. It is needless to add that this is difficult to get, as those property holders near the centre of the city believe that they are well enough supplied with transit facilities already, and they cannot yet see how a structure on which trains will be moving to and fro in front of their property is to increase its value or benefit them in any way; while, on the other hand, those living at some considerable distance are most anxious for the elevated roads. The "Alley" is built under the general railroad law, which does not require this permission of property holders, and in that it has the advantage.

The rival railroads between London and the north of Scotland are again shortening the time of their fast passenger trains, though they have not as yet put in force any eight-hour schedules, such as they ran between London and Edinburgh in 1888, when the trains occasionally came in half an hour ahead of time. *Engineering* prints condensed time-tables showing that the trains starting in the morning run from London to Edinburgh in 8½ hours, by both the East Coast and the West Coast lines. The recent improvements consist principally in accelerating the afternoon trains, so as to bring them up to an equality with those just mentioned. The night mail trains are running between London and Aberdeen via the Forth and Tay bridges, 523 miles, in 11 hours 45 minutes—half an hour faster than last year. This is by the East Coast line. The West Coast line, which is 17 miles longer, takes 12 hours 5 minutes, which is 40 minutes better than was done last summer.

The New York, Lake Erie and Western now has the block system in use on the Third Division of the New York, Pennsylvania & Ohio between Kent and Galion, and it has been inaugurated without serious difficulty, although this division, which is wholly single track, is doing a heavy trunk line business. The preparations for this change were begun some months before the Ravenna collision. The Erie now runs trains under the block system on 350 miles of road east of Salamanca, most of this being double track, and on 90 miles, all single track, west of Salamanca.

NEW PUBLICATIONS.

Concerning the Means for the Diminution of Railroad Resistances. By A. O. V. Vienna, Pesth and Leipsic. A. Hartleben's Press, 1890. Octavo, 70 pp.

This little pamphlet belongs to the class of books for the reading of which life is certainly too short. It is a review of the causes of railroad resistances, or at least those which the writer thinks are susceptible of reduction, namely: The shape of the rail and wheel tread; end play of axles; swiveling of axles; coupling and buffing apparatus. With the exception of the last mentioned item, which is a plea for central buffers, there is practically no value whatever in the book. It would seem that railroad men, and for such it seems intended, must be of very different material in Germany from those elsewhere if they will go beyond the eleventh page of the book, where, after two pages of mathematics to prove a point, the author adds: "This is also evident by inspection."

His conclusion that central buffers are best will hardly be questioned either on this side the water or the other. The difficulty in Europe in changing is mainly in the existence of side buffers on the entire rolling stock. It is like the difficulty of changing to hook couplers on the freight stock in this country. The transition state has to be provided for as well as the final condition. The reasoning by which our author arrives at this conclusion is, however, amusing in places. He decides by some queer mathematics that a train with side buffers must have a tendency to press the inside rail at the ends and the outer one in the middle. It would have been better if the inspection method had been applied here also, as it might have led him to further examination of his mathematical process. The fact of the matter is that the action of the buffers simply intensifies the action of the engine in pulling the train toward the inside of the curve. The train, by virtue of the resistance of the buffers, is made to resemble a straight spring which can only be bent out of the straight line in either direction by an effort. If such a spring is placed in a curved groove and drawn along in it, it must inevitably press against the inner side of the groove at the center and against the outside at the ends, except so far as the tangential draught at the front end causes that end to leave the outer side of the groove.

Facing page 56 of the pamphlet is to be found a modification of the systems of hooks and screws used for coupling European cars. By a foot note on page 59 it appears that this represents the author's striving for simplicity in a central draught and buffing gear; limited, however, by the condition that one book and chain is not considered sufficient. If the author had read the *Railroad Gazette* as diligently of late years as he seems to have the European literature of the subject he might possibly have found a score or so draught gears which in combination with a safety chain would have satisfied the conditions. It is perhaps too much to expect of the average German railroad pedant that he should study American

rolling stock, in spite of the fact that it is used on more than half the mileage of the world, is the most homogeneous over that mileage of any system of rolling stock in the world, has been developed solely on the basis of the survival of the fittest, and that with but one striking exception, our journal boxes, it is, so far at least as the carrying stock is concerned, the most powerful and easy running in the world.

Massachusetts Institute of Technology.—The Institute has issued a pamphlet giving a technical description of the engineering building of the Institute by various members of the faculty. The structure is 158 × 62 ft. and six stories high. It is of modern mill construction and is a very interesting example. It was the aim to make it sufficiently free from vibration, even when heavy machinery is running in the basement, to permit delicate experiments and measurements to be made, and also to permit the four upper floors to be used for drafting rooms. The building contains a laboratory devoted to experimental work upon the properties of materials of construction, a laboratory of steam engineering, a hydraulic laboratory and one where other engineering experiments are made. All of these laboratories are thoroughly equipped except the hydraulic laboratory, the equipment of which is, as yet, quite limited.

The annual report of the President and Treasurer of the Institute states that 102 members of the class of '90 received the degree of Bachelor of Science. These were distributed through all the various courses of civil and mechanical engineering and allied departments. The number of students is yearly increasing. The total registration in 1890 was 937. The report gives some very interesting information as to the development of the various special courses. For instance, in the civil engineering course the time devoted to railroad management has been increased, and that is now only taken by students using the railroad option. Special progress is made in the development and extension of instruction in highway engineering. The course in mining, engineering and metallurgy was wholly rearranged in 1890 and much altered.

Strains on Railroad Bridges. Report of the Board of Railroad Commissioners, State of New York. Charles F. Stowell, Bridge Engineer.

In 1884 the Railroad Commissioners of the State of New York issued a circular to the railroad companies of the state asking for drawings, with full particulars as to dimensions, of all their bridges. Considerable objection was raised by the roads at first to furnishing this information, but it has gradually been given, until now the Commissioners are able to present diagrams, descriptions and strains for all of the 2,500 truss railroad bridges in the State of New York. The strains on all these bridges have been calculated by Mr. Charles F. Stowell, bridge engineer to the board. When it has been discovered that a member was overstrained or that the bridge was otherwise faulty in design construction or material the attention of the owners has been called to it by the board. Out of the 2,500 bridges, drawings of which have been examined, 669 have been criticised by the board. Of these 535 have been repaired and 134 entirely rebuilt. No doubt the work of the Commission in this respect has been one of very great value to the railroads themselves as well as to the public, probably of greater value to the roads than to the public. The higher officers of the roads have learned of weaknesses of their structures which they did not suspect and have been enabled to cause these weaknesses to be remedied. The volume contains, besides the diagrams and data mentioned above, the criticisms of the board on the various structures described.

THE SCRAP HEAP.

Foreign Notes.

The employés on the various railroads of Saxony are agitating for a general improvement in their condition, the main points sought being a reduction in the number of working hours, one day of rest out of seven and a guarantee of continued employment after having completed 10 years of service.

According to the *Schweizerische Bauzeitung*, a rack rail locomotive built on the Abt principle was sent to Greece a few weeks ago, the first for that country. It is intended for use on the narrow-gauge road from Diacophto to Kalamyta Mr. Abt is to supply rack rails for a section of about two miles of this road.

There will be at the Frankfort Electrical Exhibition several dynamos of from 500 to 600 h. p. One of themost interesting features of the exhibition is the electric power transmission installation by which Frankfort is to be supplied with power from Lauffen, as already noted on several occasions. Three hundred horse power is to be transmitted over the distance, which is about 105 miles. The undertaking is in the hands of the Oerlikon Machine Works.

New Stations and Shops.

The New York Central is preparing plans for a new station at Syracuse, N. Y., and to provide for the running of freight trains outside the centre of the city.

The New York, New Haven & Hartford will build a new suburban passenger station at Port Chester, N. Y. It will be 125 ft. long and 35 ft. wide.

The Baltimore & Ohio will probably build a new passenger station and freighthouse at Washington, Pa., at a cost of from $40,000 to $50,000.

The work on the new shops of the Buffalo Railway Supply Co. at Bailey avenue and the Western New York and Pennsylvania Railroad, Buffalo, N. Y., is being rapidly pushed. The main building, 500 × 85 ft., is almost ready for the machinery, and within two months will be ready for work.

Fact and Fancy.

When the application of the Clover Leaf (Toledo, St, Louis & Kansas City) for a passenger differential from St. Louis was made before the Board of Rulings its representative made a pitiful plea about the superior advantages of its competitors in point of equipment and speed. General Passenger Agent Chandler, of the Wabash, took the floor, and, producing a big bundle of newspaper clippings telling about wonderfully fast runs on the Clover Leaf and elegant passenger coaches, begged for an explanation. The Clover Leaf man was cornered, and finally stated the majority of the accounts were "fireworks" set off for advertising purposes.—*Western paper.*

Professional Employment.

The Secretary of the American Society of Civil Engineers has issued the following circular, calling attention to what is apparently a neglected feature of the regulations of the society: "It seems desirable to remind the members of the society that it is one of the duties of the Secretary to keep a file of all applications for positions. Such an application should state in some detail the professional experience and previous engagements of the applicant; giving also the names of suitable references as to character and professional standing, and the kind of position and the compensation the applicant is prepared to accept. These records are communicated to persons desiring to employ engineers, but in no case will the Secretary exercise any discrimination, or carry on negotiations between parties. This intervention is solely to give information, which will be given precisely as it is furnished, save that such portion as may be confidentially given will be so treated.

"All, whether members of the society or not, who desire to employ engineers are invited to so notify the Secretary, and he will at once furnish the names and records of such engineers as may have filed application with him. The Secretary would also remind employers that the society contains all grades of men—those just beginning their experience, as well as those of matured judgment, and the applications are usually most numerous from the former."

Canadian Canal Discriminations.

The shipping interests on the Lakes are protesting against the Canadian "orders in council" which discriminate against American vessels passing through the Welland Canal, while the "Soo" Canal is free to all Canadian vessels. The contention is that a toll of 20 cents per ton on most classes of cargoes and 1½ cents on the vessel's registered tonnage is charged on all vessels passing through the canal, with a drawback of 18 cents per ton on cargo, paid only when it is delivered in Montreal or ports east of Montreal. This led to the transfer of part of the cargoes at Kingston (as some of the St. Lawrence canals are only eight feet deep) until last season, when transfers were made by American vessels at Ogdensburg, which is 70 miles nearer the canal than Kingston. Payment of the rebate was refused by the Ottawa government until about the close of the season, under the claim that the rebate ought only to be paid on grain transferred at a Canadian port, and not on grain transferred at American ports. This withholding of the rebate nearly stopped the transfer of grain at Ogdensburg, as grain shippers did not care to assume the risk of an unfavorable decision. This year one of the conditions on which the rebate of 18 cents per ton is to be paid reads: "Transshipment, if at a Canadian intermediate port, shall not prevent the refund aforesaid being made." The grain shippers thought this meant that the rebate would not be paid on grain transferred at an American port, and on shipments being made with a transfer at Ogdensburg refunding the 18 cents a ton has been declined and the matter taken under consideration at Ottawa.

The Troubles of a Sleeping-Car Agent.

Milton A. Baker and his wife (both colored) left for Chicago Thursday night in the Pullman sleeper over the International & Great Northern. . . . The agent explained as follows: "About one month ago Baker came to me and told me that he wished to purchase two through tickets to Chicago and also one lower berth in the through sleeper. I told him that I would be pleased to sell him the tickets, but could not let him have the sleeper accommodations. He insisted, but I still refused. He finally asked me to write to the superintendent of the Pullman Company in regard to the matter, and I promised to do so. After that I disliked to let him have the berth and avoided him. He finally cornered me Saturday and asked me to reserve him a berth for Monday night. I told him they were all taken. He said Thursday night would do; I gave him the same answer. He then suggested Wednesday night, and I told him they had been ordered a week in advance. He said he would wait and go the first day that the berths were not all taken. Thursday Baker came into my office and tendered me the money for the berth, and in order to avoid trouble and possibly a lawsuit against the company I sold them to him. That is all there is to the case and I was unable to pursue any other course."—*Texas Paper.*

Toy Trains.

The General Passenger Agent of the New York Central has contracted with Pratt & Letchworth, of Buffalo, for the manufacture of a large number of toy railroad trains; cars to be made of pressed steel, locomotives of malleable iron, and to be fac-similes of the passenger equipment of the New York Central, with the name of the road on each car and locomotive, the whole train to be 45 in. long. Mr. Daniels' idea is to predispose infants to make their wedding tours, in the next generation, in the compartment cars of the New York Central.

The Separate-Car Law in Texas.

No longer does the colored lady and gentleman and the white woman and man occupy the same coach. . . . Who derives the benefit from the separate coach law? The negro. The negro woman no longer is offended by the presence of white convicts, but the white lady occupies the same train with colored gentlemen who wear shackles around their necks if there be a white sheriff with them. . . . The negro occupies his coach alone, while the whites are wrestling with the 40 horse power stench which arises from half a carload of the great unwashed in charge of an immigration agent. On the Southern Pacific Sunday afternoon there were two Chinamen in the white car; there were none with the negroes. On another train there were three Mexicans in the white car; there were none with the negroes. On the northbound Houston & Texas Central there were several loud-smelling immigrants in the white car; there were none with the negroes. On a train last night there were 10 white and negro convicts in the white car; there were none with the negroes. If the white people can stand it, should the negroes kick?—*Texas Paper.*

The Gulf, Colorado & Santa Fe is running chair cars between Galveston and Houston, the coaches being labeled for the whites and for the blacks. On its main line this road is running the same kind of cars heretofore used, except that a neat partition has been placed in the coaches, dividing them into sections, one of which is labeled for the white people and the other for the dusky public. The International & Great Northern is running partitioned cars.

False Branding at the Bochum Steel Works.

Very grave charges are made against Mr. Baare, the Director-General of the Bochum Union, and the administration of the steelworks. The charges were brought to the front in the course of a suit instituted by the German government for additional income tax. They are "that during the last 16 years the Bochum Steel Works have systematically practiced *stamping forgeries* of the worst kind, on German, foreign and colonial railroad administrations and companies; that such stamping forgeries were carried out in such a way that the official stamps of the Government or Railroad Inspectors and Comptrollers were systematically imitated, and that after the inspection, those rails, etc., which had been rejected were stamped with the forged stamp, which had during the inspection and examination been prepared by an engraver specially retained by the Bochum Steel Works for this purpose." Further, it is charged that specially made axles, etc., were tested for which others were substituted and fraudulently stamped. A number of such stamps were shown with orders to and receipts from the makers, and accidents on railroads were cited which it is alleged have been caused by breakdowns in consequence of the fraudulent practices of the Bochum Union. It hardly seems possible that a swindle of such a kind could be continued for so long a time.

In England the other day a Mr. Bellingham, chain manufacturer of Cradley Heath, who had an order for 552 fathoms of chain to be made from "best best Lion" iron, substituted another brand for all but 24 ft. of the chain. The owners of the "Lion" brand, hearing of the transaction, and knowing that Bellingham had not purchased iron enough to make the chain, instituted proceedings by which the defendant was fined £20, lost his chain and agreed to give £25 to a hospital in lieu of imprisonment.

LOCOMOTIVE BUILDING.

The Norfolk & Western has ordered from the Roanoke Machine Works three class "G" locomotives.

The Illinois Central has placed orders with the Rogers Locomotive Works for 22 consolidated engines.

The Buffalo, Rochester & Pittsburgh has placed in service the six engines recently received from the Baldwin Locomotive Works.

The New York Central & Hudson River road has ordered several double-header Forney type locomotives from the Schenectady Locomotive Works, for suburban service. Two of the engines will be compounded.

Six new 52 ton passenger locomotives which were ordered for the Central of Georgia, some time ago, have just arrived at Savannah. They will run on the main stem between Atlanta and Savannah.

The Southern Pacific last week put in service west of San Antonia, Tex., two ten-wheel locomotives built at the Schenectady Locomotive Works. Two others had previously been delivered. The driving wheels are 5 ft. 3 ins. in diameter and cylinders, 18 × 24 ins. The engines with tenders weigh 150,000 lbs. They are for freight and passenger service.

CAR BUILDING.

The Baltimore & Ohio has received from the Pullman Car Co. the first lot of 34 sleeping and parlor cars ordered for Washington and New York service, similar to those of the Royal Blue line.

The Ohio Falls Car Co., of Jeffersonville, Ind., is building 600 grain cars for the Pennsylvania Co., completing the order at the rate of 10 cars a day.

The Bloomsburg Car Co., of Bloomsburg, Pa., is working on an order for box cars for the East Tennessee, Virginia & Georgia.

The Roanoke Machine Works are building 150 platform cars and 25 caboose cars for the Norfolk & Western.

The Youngstown Car Mfg. Co. has been recently awarded a contract for 500 gondola cars for the Pittsburgh & Lake Erie.

The Bradley Car Works, of Worcester, Mass., have just built two postal cars, with several novelties, one for the Boston & Albany and one for the New York New Haven & Hartford.

The Jackson & Sharp Co. has just delivered to the Long Island 20 new passenger cars, equipped with the Creamer system of automatic ventilation. The road had 20 cars built last year by the Pullman company, similarly equipped.

The Crossen Car Mfg. Co., of Cobourg, Limited, has been formed to carry on the car building business of the late James Crossen. William J. Crossen, who has managed the works at Crossen, Ont., since the death of James Crossen, is General Manager of the new concern, and L. J. Crossen is Secretary and Treasurer.

BRIDGE BUILDING.

Albany, Or.—The county court has appropriated $40,000 toward building a steel bridge across the Willamette River at Albany. The City Council will furnish the remainder of the $83,350, which is to be the cost of the bridge. The contract has been let to construct the bridge at the price named, to the Portland Bridge Building Co., agents for the King Iron Bridge Co., of Cleveland, O.

Angora, Pa.—The long wooden bridge on the Philadelphia, Wilmington & Baltimore over Cobb's Creek, at Angora, is being replaced by a double-track iron structure.

Atlanta, Ga.—The City Council has passed a resolution asking the Legislature to allow the city to pay for the Forsyth street bridge out of the income of the city for the next three years, and a bill has been introduced in the State Legislature for this purpose.

Baltimore County, Md.—Proposals were opened July 16 by the County Commissioners for building two iron bridges, one over Brice's run, east of Woodstock, and the other over Piney run, west of Sparks Station. The bids were as follows: Penn Bridge Co., Brice's run, $14.30 per lineal foot; Piney run, $13.97. Youngstown Bridge Co., Brice's run, $897 for the bridge; Piney run, $847. Berlin Iron Bridge Co., Brice's run, $1,095; Piney run, $995. King Iron Bridge Co., Brice's run, $933; Piney run, $816. Massillon Bridge Co., Brice's run, $790;

Piney run, $644. Pittsburgh Bridge Co., Brice's run, two plans, one $774, the other $834; Piney run, $766 and $755. Wrought Iron Bridge Co., Canton, O., Brice's run, $710; Piney run, $680. Groton Bridge Co., Brice's and Piney runs together, $1,469. Samuel Stauffer, York, Pa., Brice's run, $1,047; Piney run, $899. The contract was not awarded. The Wrought Iron Bridge Co. is the lowest bidder.

Beatrice, Neb.—The County Board of Supervisors has awarded the contract for building the Sixth street bridge across the Blue River to the George E. King Bridge Co, of Des Moines, Ia. The structure is to cost $16,500. The same company has also been awarded the contract to build eight other smaller bridges in the county at a total cost of $3,600.

Bellaire, O.—A bridge is to be erected over the Wegee Creek at south of Bellaire for the Pittsburgh, Ohio Valley & Cincinnati.

Beverly, W. Va.—Bids will be received until June 24 by F. T. Triplett for constructing an iron bridge over Tygart's Valley River.

Boston, Mass.—Proposals for a temporary bridge from Marine Park to Castle Island were opened last week by the Park Commissioners. The bids were: Horace Slas, Boston. $39,960; J. N. Hayes & Co., $43,000; B. F. Nay & Co., $41,783; Perkins & White, $36,700; George H. Cavanaugh, $35,000; William L. Miller, $32,300. The bids were taken under advisement.

Buchanan.—The Central Land Co. has let a contract to the A. Withrow Lumber Co., of Millboro, for the construction of a wooden bridge over the James River, near Looney's Creek, to cost about $10,000.

Buckley, Wash.—Tweed & Savage, of Olympia, Wash., have been awarded the contract for a combination wood and iron bridge across White River, to be built by King and Pierce counties. The bridge will cost $2,915. Bids were submitted by Hoffman & Bates, Portland, Ore.; Oregon Bridge Co., and Munson & Shurz, Tacoma, Wash.

Chester, Pa—An iron bridge is to be erected over the Brandywine River at Chester by the County Commissioners and the electric street railroad, to replace the present wooden structure.

Cincinnati, O.—The long iron viaduct at Liberty street over the Mill Creek Valley to Price Hill is nearing completion and will be opened in a month. It is being built by the Milwaukee Bridge Co., and was designed by James M. Harper, County Engineer. The viaduct is 2,202 ft. long, has a roadway of 20 ft. with a 5-ft. sidewalk on either side, making its whole width 30 ft. It is 104 ft. high and, when completed, will cost $67,777.

Clinton, Tenn.—Anderson County, Tenn., will erect an iron bridge over Hind's Creek, near Clinton. The bridge will have a 50-ft. span, with two iron piers. Orville Taylor, of Clinton, will receive bids.

Cohoes, N. Y.—Sealed proposals will be received till July 27, for building a stone arch and approaches connecting Garner and Division streets, Cohoes. Specifications can be seen at the office of Edward Hayes, C. E., No. 8 Harmony Hotel Building, Cohoes.

Columbus, O.—Bids will be received until July 30 for building a bridge across the Olentangy River. The bridge will be a single span of 200 ft. through bridge, Whipple truss, 14 panels 14 2-7 ft., height of truss 30 ft. The abutments are at right angles to the line of the bridge. There will be one roadway of 36 ft. and two sidewalks of 6 ft. each.

The Detroit Bridge Co. has the contract to erect four iron bridges on the Hocking Division of the Columbus, Hocking & Toledo.

Mulliken, Md.—The contract for a bridge over Patuxent River has been awarded jointly by Anne Arundel and Prince George's counties. The bridge is to be of iron, and will be 140 ft. long, with a 12-ft. roadway and two spans of 72 ft. 6 in. each. The location is three and a half miles from Mulliken Station.

Queen Anne, Md.—The Anne Arundel County Commissioners have awarded to Dean & Westbrook, of New York, the lowest bidders, the contract for building a bridge over the Patuxent River, near Queen Anne. The price is $2,974.

Parkersburg, W. Va.—The Parkersburg Bridge Co. completed its organization last week, when the following directors were elected: John S. Camden, O. S. Jones, J. H. Fischer, S. P. Wells and S. W. Goff. S. P. Wells has been elected President and W. M. Straus, secretary. The contract for the superstructure will probably be awarded shortly. Jolly Bros., of Pittsburgh, are building the masonry work.

Phipsburg, Me.—The County Commissioners of Sagadahoc recently voted to build a bridge costing about $10,000 to Popham Beach near Phipsburg. Injunctions are threatened by property owners if they let contracts.

Pittsburgh, Pa.—The Suspension Bridge Co., of Pittsburg, has awarded to the Union Bridge Co., of New York, the contract to erect a new bridge across the Allegheny River from Pittsburgh to Allegheny City. It will be a truss structure, with four tracks and two pathways. The price is $308,527, which will put the total cost of the bridge at about $500,000.

St. Louis.—The Wrought Iron Bridge Co., of Canton, O., recently shipped by a special train of 27 cars the first of the iron for the new viaduct which is being built on Twenty-first street. The viaduct will be completed in November.

San Lucas, Cal.—The Board of Supervisors of Monterey County advertise for bids for the construction of a bridge across the Salinas River at San Lucas. The bridge will be from 800 to 1,000 ft. long and will be the fifth erected across the same river in this county during the past two years.

Sioux City, Ia.—The Chicago, St. Paul, Minneapolis & Omaha will probably agree to the new plans prepared by the engineers for the Fourth Street Viaduct. The plans propose a viaduct 60 ft. wide, including a 40-ft. road and with earth approaches, the railroad not agreeing to the City Council's proposal for iron or steel approaches.

Tiffin, O.—The Pennsylvania has commenced to build the abutments for a union bridge over the Sandusky River at Tiffin. The superstructure will not be erected until next summer.

Wheeling, W. Va.—The iron bridge of the Wheeling Bridge & Terminal Co., across the creek at the Whitaker mill, has been completed ready for the track. The northern approach is being filled in solidly with earth and rock.

Willimansett, Mass.—The following proposals were received by the Commissioners of Hampden County, Mass., July 14, for building the superstructure of the Willimansett bridge over the Connecticut River between Holyoke and Chicopee, Mass., in accordance with plans and specifications by Edward S. Shaw, Consulting Engineer, of Boston. The bids were upon the following items: No. 1 A, wrought iron in structural parts of bridge, per pound, 1,503,000 lbs.; No. 1 B, an alternative of steel for certain members and parts, per pound, 1,322,000 lbs.; No. 2, wooden flooring, per lineal foot, 800 lineal feet; No. 3 A, sidewalk railings, per lineal foot, 1,600 lineal feet; No. 3 B, alternative railing, per lineal foot, 1,600 lineal feet.

PROPOSALS FOR WILLIMANSETT BRIDGE.

	Item No. 1 A. Cts. per lb.	Item No. 1 B. Cts. per lb.	Item No. 2. $ per lin'l foot.	Item No. 3 A. $ per lin'l foot.	Item No. 3 B. $ per lin'l foot.	Totals. No. 1 A, No. 2 & No. 3 A.	No. 1 A, No. 2 & No. 3 B.	No. 1 B, No. 2 & No. 3 A.	No. 1 B, No. 2 & No. 3 B.
Berlin Bridge Co., East Berlin, Conn	3.685	3.825	9.19	1.35	1.75	$64,897	$65,537	$60,077	$60,717
R. F. Hawkins Iron Works, Springfield, Mass	3.74	3.81	10.50	1.00	1.35	66,212	66,772	60,367	60,927
Penn Bridge Co., New York, N. Y	3.89	3.89	8.70	1.49	2.09	67,811	68,771	60,768	61,728
Rochester Bridge Works, Rochester, N. Y	3.88	3.97	9 25	1.60	1.92	67,976	68,788	62,442	62,954
Vermont Construction Co., St. Albans, Vt	4.00	4.10	10.25	1.00	1.25	69,920	70,320	64,002	64,402
Boston Bridge Works, Boston, Mass	3.74	3.82	13.95	1.30	2.70	70,412	71,692	64,699	65,979
Pencoyd Bridge & Construction Co., Philadelphia, Pa	3.90	4.04	12.00	2.25	2.50	71,817	72,217	66 608	67,0 8
Cofrode & Saylor, Pottstown, Pa	3.98	4.18	11.65	1.65	2.30	71,779	72,819	67,218	68,258
Springfield Iron Works, Springfield, Mass	4.15	4 25	11.25	1 65	2.25	73,934	74,974	67.745	68,785
King Iron Bridge Co., Cleveland, O	4.35	4.45	8.64	1.35	1.80	74,452	75.172	67,899	68,619
Keystone Bridge Co, Pittsburgh, Pa	4.213	4.377	10.00	1.50	2.0	73,721	74,521	68.263	69,063
Hilton Bridge Construction Co., Albany, N. Y	4.00	4.35	10 25	1.60	2 25	70,880	71,920	68,267	69,307
Pittsburgh Bridge Co., Pittsburgh, Pa	4.19	4.29	12.00	1.35	1.80	74,736	75,456	68,473	69,193
Youngstown Bridge Co., Youngstown, O	4.22	4.34	11.00	2.25	2 75	75,827	76,627	69,775	70,575
New Jersey Steel & Iron Co., Trenton, N. J	4.50	4.64	9.34	1.49	2.11	77,491	78,483	71,196	72,188
Passaic Rolling Mill Co., Paterson, N. J	4.16	4.32	17.25	2.00	2.75	79,525	80,725	74,109	75,309
Groton Bridge Co., Groton, N. Y	4.60	4.80	10.00	2.00	2.50	80,338	81,138	74,655	75,455
Massillon Bridge Co., Massillon, O	4.68	4.92	10.50	1.31	1.90	80,83[illegible]	81,780	75,537	76,481
Dean and Westbrook, New York, N. Y	4.69	4.70	17.98	1.50	1.75	87,275	87,675	78,918	79,318
W. H. Shepard & Sons, Havana, N. Y	5.125	5.375	10.00	2.00	2.30	88,229	88,709	82,257	82,737

Fiskill, N. Y.—The bid of the Berlin Bridge Co., $4,589, for an iron bridge, 109 ft. long with an 18 ft. roadway, being the lowest was accepted.

Leavenworth, Kan.—The pontoon bridge at this place to the Missouri shore was recently broken and has not been replaced. An iron bridge is desired, but it is not likely to be built, except by a private company.

Low Moor, Va.—A bridge will be built over the Jackson River, near Low Moor, Va., by the Allegheny Mining and Development Co.

Loudoun County, Va.—The Commissioners of the County will receive proposals until Aug. 10 for the masonry of two bridge abutments. E. G. Caufman is Chairman of the Board.

Madison, N. C.—The Piedmont Land Co. will build a new bridge over the Mayo River near its property.

Memphis.—The bridge near the intersection of Dunlap and Hawley streets will probably be rebuilt by the county and city jointly.

Missoula, Mont.—The County Commissioners have voted $10,000 and the town $25,000 to build a new bridge at Higgins avenue. Opposition has developed to the site chosen, and the erection of the bridge may be delayed until next year.

The contract was awarded by the commissioners to R. F. Hawkins, of Springfield, on the basis of bids for item No. 1 B, item No. 2 and item No. 3 B.

Winona, Minn.—Trains are now running over the new iron bridge of the Winona Bridge Co., across the Mississippi River. The Chicago, Burlington & Northern, the Green Bay, Winona & St. Paul and the Winona & Southwestern are equally interested. The structure cost nearly $500,000. The bridge proper consists of four spans, two of 240 ft. each, one of 360 ft. and a draw span of 420 ft. The approaches aggregate 1,500 ft.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Texas it is held by the Supreme Court that in a bill of lading for a bull a provision limiting the liability of the carrier to $30 is not valid, and the shipper may recover according to the measure of damages fixed by law.[1]

In the same state it is laid down that under a stipulation in a bill of lading that no action for breach thereof shall be sustainable, unless brought within 40 days after the right of action has accrued, a delay for a longer period will not bar an action for breach of a prior verbal contract to furnish cars for the shipment of stock at a certain place on a certain day,[2]

In Kentucky the Court of Appeals rules that on the condemnation of land taken by a railroad company for its right of way, the damages are to be assessed as of the time of the filing of the petition, and not the time of the original entry, nor of the award.[3]

In Arkansas the Supreme Court holds that the value of a railroad already constructed on the land by the railroad company or its vendors is not to be included in the damages assessed, and in determining the value of the land taken any depreciation or deterioration that may have resulted to it specially from the building of the road on it will be disregarded, but such as may thereby have resulted to it in common with other lands in the neighborhood will be considered.[4]

In West Virginia it is laid down that under the State Constitution, providing that "private property shall not be damaged or taken for public use without just compensation," the owner of land in possession of a tenant may, in trespass on the case, recover the permanent damages resulting from the construction of a railroad in an adjacent street.[5]

In New York it is held by the Supreme Court that damages to the inheritance may be recovered by the owner in fee of demised premises, resulting from the erection of an elevated railroad, notwithstanding the fact that such damages accrued during the existence of the demise, their measure being the difference in rental value free from the trespass and the value subject to it.[6]

In New York a railroad before commencing proceedings to condemn easements in property abutting on a street in which the company has operated its road for 10 years, no compensation having been paid for such easements when the road was built or proceedings had to condemn the same, employed reputable and experienced brokers, who had not before been employed by it, to examine the property and fix the compensation which ought to be paid to the owners. The company then offered to pay the sums so fixed, and allowed the owners 48 hours to make answer. The Supreme Court rules that the company in good faith endeavored to purchase.[7]

In Illinois the Supreme Court rules that when by mistake a mortgagee is not made a party defendant to a proceeding to condemn part of the mortgaged land for railroad puposes, and the railroad company does not discover the existence of the mortgage until after it has condemned the land, built its road thereon and paid the compensation therefor to the county treasurer for the benefit of the owner, the company may by bill in equity restrain the payment of such compensation to the mortgagor, and have it paid to the mortgagee, to be be applied on the mortgage debt.[8]

In Kentucky it is held by the Court of Appeals that when a track is laid in the middle of a street so as to leave 19 ft. on each side of it between the track and the sidewalk, the owners of lots facing on the street have no right of action for interference with access to their property.[9]

Injuries to Passengers, Employes and Strangers.

In Pennsylvania the defendant used a railroad track in connection with his coke furnace, which track forms the arc of a circle, and is crossed twice by the track of a common carrier railroad, which subtends the arc as a chord. By the negligence of defendant's engineer, one of his engines on the furnace track collided with a passenger train on the carrier track. Defendant's engineer, just before the collision, reversed his engine, shut off the steam and jumped to the ground. By the jar of the collision the throttle on defendant's engine was reopened, and it started backward around the track, and again came into collision with the passenger train on the second crossing, where it had been stopped. The Supreme Court decides that the negligence of the employes on the passenger train, contributing to the accident, connot be imputed to a passenger injured by the second collision, nor will his relation to the carrier company compel him to resort to it, to the exoneration of defendant.[10]

In Texas the Supreme Court ruled that the statute requiring railroads to warm and light their depots applies to all passenger depots, and is not confined to those at the junctions of railroads. And a company having neglected during cold weather to heat its depots, a passenger may recover for suffering sustained from contracting a severe cold and a fever while waiting several hours for a delayed train.[11]

In New Hampshire the Supreme Court holds that notice to a railroad conductor that a passenger going on his train is in feeble health is notice to the corporation, and the omission by the passenger to repeat such notice to another conductor, who takes charge of the train before the end of the journey, does not constitute contributory negligence.[12]

In Louisiana it is held by the Supreme Court that a passenger having been ejected from a train while attempting to ride on a commutation ticket issued to a firm, he has the burden of proving the existence of the firm and that he was a member thereof.[13]

In Georgia, the Supreme Court rules that a passenger who applies for a ticket to one point and is by mistake given one to another, but has her trunk checked to her destination, may recover for her ejection by a conductor who is informed of these circumstances, and of her inability to pay the fare.[14]

In Iowa a minor was a brakeman on one of defendant's trains, in which were coal cars having end boards, secured by hinges, which permitted their lying down on the floor of the car. Being required to set the brakes, deceased attempted to pass over one of these end gates, which was inclined at an angle of 20 or 30 degrees, because of coal, snow and ice under it, and was covered with snow and ice, and in so attempting slipped, and fell under the cars and was killed. The Supreme Court holds that an instruction that defendant is not liable because it is not shown that the end board was defective, and could not have been raised and secured in that position by deceased, was properly refused, for the reason that it omitted the essential element that deceased knew of the dangerous position of the end gate, and had time and opportunity to raise it.[15]

In Texas the Supreme Court decides that in an action by a servant against his master for personal injuries caused by the negligence of a fellow servant, it is proper to instruct the jury that, if defendant failed to exercise reasonable care in providing such rules or usages for the conduct of its business as to afford its servants reasonable means of protection, and such failure was the cause of the accident, defendant would be liable, unless plaintiff was, by his own negligence, precluded from recovering, but that the plaintiff cannot recover if defendant had provided such rules, and plaintiff was hurt through failure of his fellow-servant to obey the rules.[16]

In the same state the Supreme Court rules that retention by a railroad company of an employé whose acts caused an injury to another does not impose on the company a liability for such injuries which otherwise would

not exist, nor constitute a ratification of his wrongful act.[17]

In Alabama the Supreme Court rules that when a collision occured because the brake was defective, the fact that the car belonged to another railroad company will not exonerate defendant from liability, as the law which renders the master liable for injuries to the servant from defective appliances makes no distinction as to the measure of the master's duty between appliances owned by himself and those owned by others, but used by him in his business.[18]

In New York in an action against a railroad company for the death of an employé it was shown that the train dispatcher directed the telegraph operator at P. to "flag and hold train No. 1." The operator supposed that No. 1 was to be held for No. 2, and when No. 2 was out of the way he took down the red flag, which was the signal to stop, and No. 1 passed beyond P. and collided with No. 6, killing plaintiff's intestate. Defendant's rules required that freight trains should not run at a speed in excess of 15 miles an hour between stops. The intestate, on No. 1, which was a freight train, was running at a speed of 30 miles an hour, knowing that there was an imminent risk of meeting No. 6 if it was on schedule time. The Court of Appeals rules that he was guilty of contributory negligence.[19]

In Indiana a railroad employé was injured by the breaking of a cable used to draw a plow over flat cars loaded with gravel. The cars were at the time standing on a curve, and in that position the strain on the cable was greater than when the cars were on a straight track, and required additional appliances to those in use at the time in order to render its use entirely safe. There was no evidence that the cable was insufficient to operate on a straight track. The Supreme Court holds that the evidence justified a verdict that the accident was caused by the company's negligence in not providing suitable machinery.[20]

[1] St. L., A. & T. R. Co. v. Robbins, 14 S. W. Rep., 1075.
[2] McCarty v. Gulf, C. & S. F. Ry. Co., 15 S. W. Rep., 164.
[3] Newgass v. St. Louis, A. & T. Ry. Co., 15 S. W. Rep., 188.
[4] Newgass v. St. Louis, A. & T. Ry. Co., 15 S. W. Rep., 188.
[5] Fox v. Baltimore & Ohio R. Co., 12 S. E. Rep., 757.
[6] Conkling v. Manhattan Ry. Co., 12 N. Y. S., 846.
[7] In re Metropolitan El. R. Co., 12 N. Y. S., 502.
[8] Calumet River Ry. Co. v. Brown, Ill., 36 N. E. Rep., 501.
[9] L. & N. R. Co. v. Orr, Ky., 15 S W. Rep., 8.
[10] Bunting v. Hogsett, 21 Atl. Rep. 31.
[11] Texas & Pac. Ry. Co. v. Mayes, 15 S. W. Rep., 43.
[12] Foss v. B. & M. R. Co., 21 Atl. Rep., 222.
[13] Granier v. Louisiana W. R. R., 8 South. Rep., 614.
[14] Georgia R. & B. Co. v. Dougherty (Ga.), 12 S. E. Rep., 747.
[15] McDermott v. Iowa Falls & S. C. Ry. Co., 47 N. W. Rep., 1037.
[16] International & G. N. R. Co. v. Hall, Tex., 15 S. W. Rep., 108.
[17] Gulf, C. & S. F. R. Co. v. Kirkbride, 15 S. W. Rep., 495.
[18] L. & N. R. Co. v. Davis, 8 South. Rep., 552.
[19] Sutherland v. Troy & Boston R. Co., 29 N. E. Rep., 609.
[20] Cin., I., St. L. & C. R. Co. v Roesch, 26 N. E. Rep., 171.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cornwall & Lebanon, semi-annual, 2 per cent.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlanta & Florida, annual, Atlanta, Ga., Aug. 11.
Atlanta & West Point, annual, Atlanta, Ga., Aug. 5.
Marietta & North Georgia, annual, Marietta, Ga., Aug. 20.
Rio Grande Western, annual and special, Board of Trade Building, Salt Lake City, Utah, July 27.
Sevier, annual, Manti, Utah, July 28.
Tintic Range, annual, Provo, Utah, July 29.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Roadmasters' Association* will hold its ninth annual meeting at Boston, Mass., August 19 and 20.

The Roadmasters Association of America will hold its next annual convention at Minneapolis, Minn., Sept. 8-10.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union Station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street New York

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursdays at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court. Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* hold regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of erch month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at iss rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers' of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N.Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis. Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 p .m. on the first Friday of each month.

Roadmasters' Association of America.

The ninth annual convention of the Roadmasters' Association will convene at the West Hotel, Minneapolis, Minn., Sept. 10, at 10 a. m. The sessions will close Sept. 12,. The following questions will be discussed:

Standard Frogs; New Joints (report of committee); Interlocking Devices; Position of Guard Rail at Derailing Switch; Track Jacks; Track Work (best method of performing same upon the various kinds of ballast); Chemicals used in Steel Rail (what is proper proportion, also weight and cross-section, necessary to obtain the best results); Laying Rails (by which mode, even or broken joints, can best results be obtained ?).

The Committee of Entertainment has arranged for visits to the Minneapolis Exposition and State Fair, the flour mills and other places. Reduced rates have been secured at the West Hotel.

The Master Mechanics' Association.

The articles of incorporation of the American Master Mechanics' Association were filed in New York this week in accordance with the action taken at the convention at Cape May. The managers are: John Mackenzie, of Cleveland, O.; John Hickey, of St. Paul, Minn.; William Garstang, of Richmond, Va.; Angus Sinclair, of New York City, and Orlando Stewart, of Charlestown, Mass.

PERSONAL.

—Mr. J. D. Riddell has been appointed Commissioner of the Indianapolis Freight Bureau, succeeding Mr. Thomas Moore, resigned.

—Mr. E. E. Beckley, Superintendent of Construction of the Cincinnati, Wabash & Michigan, has resigned that position to become Secretary of the Sioux Valley Stone Co., of Minnesota.

—Mr. Gardner M. Lane, Second Vice-President of the Union Pacific, has resigned that position, to take effect Aug. 11. The office has been a financial one and will be consolidated with that of President.

—Mr. H. E. Huntington has personally denied the recent reports that he would resign his position as General Manager of the Newport News & Mississippi Valley Co. to accept an office on the Southern Pacific.

—Mr. W. N. Marshall, General Superintendent of the Savannah, Americus & Montgomery, has resigned. Mr. Marshall was formerly trainmaster of the Kansas City, Memphis & Birmingham road, at Birmingham, Ala., for several years.

—Mr. John N. Abbot, who has been assistant to the President of the Great Northern road, has resigned. Mr. Abbott was formerly Chairman of the Western States Passenger Association and also General Passenger Agent of the New York, Lake Erie & Western.

—Mr. F. N. Finney, President of the Minneapolis, St. Paul & Sault Ste. Marie road, has resigned that office. He has been succeeded by Mr. Thomas Lowry, of Minneapolis, who was formerly President. Mr. Finney was elected President in June, 1890. He was formerly General Manager of the Wisconsin Central.

—Mr. J. M. Graham has resigned as Assistant General Superintendent of the Northern Pacific lines east of Livingston, Mont., the office being abolished. Mr. Graham was promoted from Division Superintendent of the Northern Pacific to be General Manager of the Northern Pacific & Manitoba when it was organized.

—Mr. C. F. Doane, who has been the agent of the Immigrant Clearing House Association at New York since Feb. 1, 1886, has resigned. Mr. Doane was formerly Eastern Passenger Agent of the New York Central & Hudson River road, and has been connected with the immigration office at New York for 22 years.

—Mr. N. L. Davis, Master Mechanic of the Rutland Division of the Central Vermont Railroad, died at his home, Rutland, Vt., last week, from the effects of a stroke of paralysis, caused by cerebral hemorrhage. He was born in Maine in 1827, and became a locomotive engineer when 19 years old. He ran the first engine on the Rutland & Burlington in 1849, and remained in the service of that company and its successors until his death. He was appointed Master Mechanic in 1864.

ELECTIONS AND APPOINTMENTS.

Abbeville & Waycross.—At a recent meeting of the stockholders at Abbeville, Ga., the following were elected directors: J. D. Maynard, P. C. Clegg, J. R. Monroe, E. H. Cutts, S. N. Mitchell, W. R. Bowen, J. A. J. Henderson, A. K. Fisher and A. I. Webb. The directors elected J. D. Maynard, President; P. C. Clegg, Vice-President, and J. R. Monroe, Secretary and Treasurer.

Augusta, Gibson & Sandersville.—Frank E. Schofield, Roadmaster, has been appointed Secretary and Treasurer, to succeed George Adam, resigned.

Baltimore & Lehigh.—A. R. T. Lackie has resigned as Resident Engineer of the Baltimore Belt to become Chief Engineer of the Baltimore Forwarding Co., organized to carry out the extensions and change of gauge of this road.

Bellaire, Zanesville & Cincinnati.—M. R. Seal has been appointed Assistant General Manager of the road, with office at Bellaire, O.

Chesapeake & Ohio.—The headquarters of H. W. Fuller, General Passenger Agent, will on Sept. 1 be removed from Cincinnati, O., to Washington, D. C. Charles Ryan, Chief Clerk of the General Passenger Department, will be made Assistant General Passenger Agent, with headquarters at Cincinnati, O.

Fort Scott Central.—The following Directors were elected at the annual meeting in Fort Scott, Kan., July 21: George J. Gould, S. H. H. Clark, George C. Smith, E. G. Merriam, Russell Harding, J. H. Richards and W. A. Johnson. The headquarters will be at Fort Scott.

Lockport & Buffalo.—The company, which is leased by the Erie road, elected the following officers and directors at Lockport, N. Y., July 16: President, T. T. Flagler; Vice-President, William Spalding; Secretary, W. H. Ransom; Treasurer, John T. Darrison; Directors, T. T. Flagler, William Spalding, W. H. Ransom, John T. Darrison, William W. Trevor, A. J. Mansfield, J. E. Merritt, J. Carl Jackson, A. S. Beverly, J. S. Liddle, John Hodge, William Richmond and John Lambert, all of Lockport.

Missouri, Kansas & Texas.—Charles G. Hedge, formerly Assistant to the Second Vice-President of Pullman's Palace Car Co., has been elected Secretary and Treasurer of the road, succeeding H. B. Henson as Secretary and J. J. De Neufville as Treasurer. He was at one time Auditor of the Mutual Union Telegraph Co. before its absorption by the Western Union.

Montreal & Occidental.—At the annual meeting of the company last week at Montreal, Que., the Hon. Mr. Chapleau was elected President, and A. Desjardins, M. P., Vice-President.

New York Central & Hudson River.—J. A. Decker has succeeded D. S. Gardenier as Roadmaster between Troy and Poughkeepsie, N. Y.

North Carolina.—At the recent annual meeting the following directors were elected. By the state: A. Burwell, J. L. Morehead, Charlotte, N. C.; T. F. Klutz, Salisbury; R. W. Thomas, Thomasville; M. A. Angier, Durham; R. F. Hoke and W. H. Pace, Raleigh; Donald McRae, Wilmington. The stockholders elected W. F. Kornegay, Goldsboro; H. W. Fries, Salem; B. Cameron, Stagville; James H. Holt, Burlington, N. C. At a meeting of the directors W. F. Kornegay was re-elected President and P. B. Ruffin Secretary and Treasurer.

Paducah, Tennessee & Alabama.—J. Welch has been appointed General Freight Agent, vice C. M. Wead, resigned, with headquarters at Paducah, Ky.

Peninsular Railway & Navigation.—A. J. Littlejohn has been appointed Receiver of this company, the headquarters of which are at Tacoma, Wash.

Rio Grande Junction.—W. G. Choate has been appointed Superintendent of the road, *vice* Thomas Saunders, resigned. The appointment takes effect August 1.

Roxborough.—The following are the incorporators of this Pennsylvania company: William T. Dixon, Philadelphia, President; William J. Donohugh, John C. Klander, Chas. L. Hamilton, Jacob S. Fry and Francis S. Cantrell, Philadelphia, and Percival K. Boyer, Roxborough, Pa.

St. Louis Southwestern.—The headquarters of the freight and passenger departments of the St. Louis Southwestern of Texas have been removed from Texarkana to Tyler.

San Joaquin Valley.—The following officers have been elected by the company: President, Marcus Pollasky, San Francisco, Cal.; Secretary, Gilbert R. Osmun, Fresno, Cal.; Vice-President, Thomas E. Hughes, Fresno; Treasurer, John C. Quinn, San Francisco, and Chief Engineer, O. T. Baron, Fresno. The San Francisco office is in the *Chronicle* Building.

Texas, Louisiana & Eastern.—The following are the officers of this Texas company: C. M. Putnam, President, Kansas City, Mo.; Jas. A. Smyth, Secretary, Conroe, Tex., and W. C. Beach, Chief Engineer, Conroe.

Toledo, Columbus & Cincinnati.—C. J. Cooper has been appointed Master Mechanic, with office at Kenton, O.

Union Pacific.—The office of Fuel Agent, formerly occupied by E. F. Wells at Omaha, has been discontinued, and hereafter this branch will be under the control of the Superintendent of the Coal Department.

Union Pacific & Western Colorado.—At the annual meeting in Denver, Col., July 16, the following directors were elected; F. L. Ames, E. F. Atkins, F. Gordon Dexter and O. W. Frink, Boston; Sydney Dillon and Jay Gould, New York, and S. H. H. Clark, Omaha.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Abbeville & Tifton.—The road has been opened for traffic from Tifton north to Irwinville, a distance of 15 miles. The line is to be extended from this point northeast to Abbeville, Ga., a distance of about 25 miles. The Abbeville & Waycross is completed for a number of miles south of Abbeville, and the new line may be built to a connection with that road instead of into Abbeville. H. H. Tift, of Tifton, is President.

Alleway & Quinton.—The company has been incorporated in New Jersey, with a capital stock of $50,000, by A. O. Dayton, F. Ellmaker and S. H. Grey, of Camden, N. J., M. P. Grey, of Salem, N. J., and H. D. Welsh, R. D. Barclay and J. R. McClure, of Philadelphia.

Arbuckle Creek & New River.—The route of this road, recently incorporated in West Virginia, is from a point on Rush Run, on the south side of New River, in Fayette County, to a point near the forks of Arbuckle Creek. J. W. St. Clair and J. H. Gaines, of Fayetteville, W. Va., are incorporators.

Arcadia, Lakeland & Gulf.—The preliminary survey for this road, which is now being made by K. B. Harvey, of Punta Gorda, Fla., Chief Engineer, will probably be completed early in August. The right of way is being secured by the engineers as the survey progresses. The road is projected to extend from Lakeland south to Punta Gorda and Boca Grande, on Charlotte Harbor, a distance of about 200 miles. The road can be easily constructed, the route being generally through a level country, the grades not exceeding 26 ft. per mile. There will be about three miles of trestling and three drawbridges. Anthony Peters, of Boston, is President.

Bangor & Aroostook.—The directors last week ordered a third preliminury survey to be made for the line north to the east branch of the Penobscot River, which is about 25 miles from Brownville Junction. The survey is now being made north through Benedicta, Sherman, Patten, Crystal, Island Falls and Dyer Brook 30 miles; east through Oakfield, New Limerick and Houlton 20 miles, and again north through Littleton, Monticello, Bridgewater, Blaine, Mars Hill and Easton to Presque Isle, 135 miles from Brownville. A survey will be made for a second line from Dyer Brook through Merrill, Moro, Masardis and northward to Fort Kent, 80 miles.

Beech Creek.—It is reported that the contract will soon be let for building an extension from the western terminus at Gazzam west to La Jose, Pa., a distance of about 15 miles, to reach new coalfields. Connection will be made with new branches of the Pennsylvania.

Bennettsville & Hamlet.—Two preliminary surveys have been made for this road, the organization of which was recently noted. One survey has been made from Bennettsville, S. C., north to Hamlet, N. C., a distance of about 21 miles, and the second survey is from Bennettsville northeast to Gibson station, N. C., the terminus of the Gibson branch of the Raleigh & Augusta Air Line. Gibson is about 10 miles from Hamlet and near the state line, but about four miles east of an air line from Bennettsville to Hamlet. Little progress beyond the surveying has been made, and cannot until the northern terminus is decided upon. The road will be practically an extension of the Charleston, Sumter & Northern, which is now completed to Bennettsville. From Bennettsville to Gibson the land is level and there are no large streams to cross and only easy curves. On the more direct line to Hamlet the distance from Bennettsville to Hamlet will be 20 miles, the last seven miles next to Hamlet passing through the sand hill region, which will require more heavy work, the country being broken, and probably grades of 50 ft. to the mile will be used. G. W. Earle, of Bennettsville, is Chief Engineer.

Brookline & Pepperell.—The grading on this line from Brookline, N. H., will probably begin as soon as the Massachusetts charter is secured. The charter in New Hampshire was passed last April. Surveys have been made from Brookline via Hollis, on the Boston & Maine, N. H., at the state line, to Pepperell and Groton, Mass., a distance of about 13 miles. A large part of the right of way has been secured. Franklin Worcester, of Hollis, N. H., is President, and A. W. Locke, of North Adams, Mass., is Chief Engineer.

Buffalo & Geneva.—The contractors expect to soon resume the tracklaying on the western end of the line east of Grimesville, 11 miles from Buffalo. The track has been laid four miles further east to Looneyville, but work is delayed at this point until the bridge over Ellicott Creek has been completed. The grading has been completed at various points along the line and it is probable that the track will be soon laid on these sections and then connected at a later date.

Chambersburg & Gettysburg.—This road has now been completed from Conococheague Island, on the Mont Alto road, east to Fayetteville in Franklin County, Pa. The work is in progress from the latter town to Caledonia, about six miles from Conococheague, near Chambersburg.

Cheybogan & East Michigan.—Articles of incorporation for this company were filed in Michigan last week. The capital stock is $250,000. The road is to extend from Rainey Lake, in Presque County, west about 20 miles to Brutus, in Emmett County, Mich., on the Grand Rapids & Indiana.

Chicago & South Side Rapid Transit.—The capital stock of the company has been increased by $1,000,000, making the entire capital stock of the concern $7,000,000. The object of this increase is to meet the additional expenses of the road incurred by improvements, the construction of new cars, and the extension of certain parts of the elevated line in Chicago.

Chicago & West Michigan.—S. G. Scott, of Kalamazoo, Mich., is said to have been awarded the contract for tracklaying on the extension from Traverse City north to Petoskey and Charlevoix, Mich., a distance of 70 miles, and also on the branch from Williamston to Elk River, 10 miles. The contract for the grading was let in May to McLean Bros., of Coldwater, Mich.

Dover & Statesborough.—A new survey for the line is soon to be made by A. D. Killebrew, Chief Engineer, from Statesborough, south to a connection with the proposed Savannah extension of the Macon & Atlantic, a distance of about 25 miles. The road is projected to extend from Dover south to Jesup, Ga., a distance of 70 miles. The 12 miles from Dover to Statesborough has been graded and the track partly laid.

Duluth & Iron Range.—The contract for the work of reducing the grade of the road at Mesaba Heights, Minn., north of Duluth, has been awarded to N. Elsberg, of Minneapolis.

Duluth & Winnipeg.—Tracklaying will probably begin in a few weeks on the extension now being constructed from Cloquet to West Duluth, Minn., where a connection is to be made with the new Duluth Transfer road. At present the grading of the line is completed with the exception of a short section near Cloquet. About 1,600 ft. of trestle has been built near the St. Louis river at Cloquet, but there is other bridge work uncompleted. The extension is about 16 miles long, and it is expected that it will be completed about Aug. 15. No work has been done this year beyond Grand Rapids, Minn., the western terminus. Several surveys have been made for a new location, and it is about decided to divert the route as at present located from an air line to Winnipeg, further west, so as to run to Crookston, and thence north along the Red Deer Valley.

Fincastle & Troutville.—The Roanoke Construction Co., of Roanoke, Va., which has the contract for building this line, has resumed the grading after a short cessation of work. About four miles has been graded south of Fincastle toward Cloverdale, Va., on the Shenandoah Valley road, which has been decided upon as the southern terminus instead of Troutville. George A. Houston & Co. have the contract for tracklaying and expect to finish that work in two months.

Fort Worth & Rio Grande.—The tracklaying on the extension from Comanche southwest to Brownwood, Tex., 30 miles, was finished to the latter town July 18. The extension has been ballasted for most of the distance and it will probably be opened for traffic this month.

Gainesville, Rocky Point & Micanopy.—The grading is about half completed on the line between Gainesville and Micanopy, Fla., 12 miles. In addition to the contract let to N. A. Callison, as described last week, Carter & Owens have also been awarded a contract for part of the work. The trestle across Alachua Lake will be two miles long. The subscriptions to the stock which have been paid in by the orange growers along the line, for whose benefit the road is being built, will be sufficient to grade the line and supply the cross ties. The road will be bonded for $60,000 to supply the rails and to equip it. The bonds will be a first mortgage and bear six per cent. interest.

Hearne & Brazos Valley.—The grading has been finished on eight of the 10 miles between Hearne, Tex., and the Brazos River. The road is being graded by the farmers along the line. The tracklaying will probably begin about Aug. 15, and the line will be completed in September.

Kansas City, Springdale & Clarksville.—Articles of incorporation for this company were filed in Arkansas July 17, the capital stock being placed at $1,600,000. The road will be about 65 miles long, in northwestern Arkansas, extending from Springdale, Washington County, on the St. Louis & San Francisco southeast to Clarksville, in Johnson County.

Lancaster & Hamden.—E. P. Buell & Co., of Tarlton, O., who are building this road, have about 100 men employed on the work in Vinton County, O., south of Tarlton, but expect to increase their force to 500 men in a few weeks. The line now being built is about 25 miles long to the coal and iron fields in Vinton and Jackson counties, controlled by the contractors. It is stated that the line will be completed to Wellston, 69 miles from Columbus, this fall, and also the branches from Tarlton to Lancaster, 17 miles, and from the main line east to McArthur, 10 miles.

Lenoir City, Montvale & Carolina.—This company has been recently organized in Tennessee by Henry E. Colton, of Knoxville, and others. It is proposed to build a line from Lenoir City, on the East Tennessee, Virginia & Georgia, via McGhee, on the Knoxville Southern, near Athens, and southeast about 25 miles to Montvale Springs, Blount County. The charter also permits an extension northeast about 25 miles to Sevierville, and east about 40 miles to Paint Rock, N. C., on the East Tennessee's line to Asheville.

Macon & Atlantic.—The receiver of this road was dismissed in the District Court at Macon, Ga., on July 11. The contractors now expect to resume the grading east of Bruton toward Savannah, at once. A settlement has been effected with with most of the creditors, including the contractors, McTighe & Co., for the grading and tracklaying already done. The new contractors are J. L. McKee and W. B. Strang, Jr., of the old firm, J. S. McTighe having retired.

Maine Shore Line.—The contract for building this road was formally let on July 15 to L. D. and R. B. Green as anticipated. The line along the St. Croix River, from Calais south to Eastport about 25 miles, is to be completed by July 1, 1892. The main line is to extend from a point near Hancock or Sullivan, on the Bar Harbor line of the Maine Central easterly to a point on the line between Eastport and Calais, and it is expected that about 100 miles of the road will be completed in 1893. L. D. Leavitt, of Eastport, is President, and J. N. Green is Chief Engineer.

Michigan & Mackinaw.—This company filed articles of incorporation in Michigan last week. The capital stock is $280,000, and the principal office is at Toledo, O.

Middle Georgia & Atlantic.—The grading of the Savannah extension of this road has been commenced at Hutchinson's Island, near Savannah, to comply with the terms of the ordinance of the Savannah Council granting the island to the company. Preliminary surveys will begin at once northerly from Savannah toward Machen and Covington, passing through Swainsboro, in Emanuel County, 80 miles from Savannah. The largest bridge on the line will probably be that over the Savannah River from the west end of Hutchinson's Island. The Seaboard Construction Co., which is building the road, owns practically all the capital stock of the rail road, and $240,000 of bonds that were issued. The company proposes to ask a subscription of $150,000 from Savannah to its stock. J. P. Williams is President of the construction company; W. B. Thomas, General Manager, and Arthur Pew, Chief Engineer.

New Roads.—L. B. Parsons, of Flora, Ill., and others have caused a survey to be made of a line from Flora, on the Ohio & Mississippi, northeast about 10 miles, to Sailor Springs in Clay County, Ill. It is expected that the Ohio & Mississippi will build the line or largely aid its construction.

Right of way has been partly secured for a proposed road from Marion northwest to Duquoin, Ill., a distance of 25 miles, both points being on the St. Louis, Alton & Terre Haute. A preliminary survey for the line has just been completed by James Dennis.

A. M. Gallup, of Swanton, Vt., is said to have the contract for grading about 10 miles of road for the Wild River Lumber Co., from Gilead, Me., on the Grand Trunk, to the timber lands of the company.

Omaha, Kansas Central & Galveston.—The contract for grading the line through Kansas south of Lyons is said to have been awarded last week to T. A. Butler, of Lyons, Kan.

Peninsular of Lower California.—The engineers have completed the locating survey on about 50 miles of the route in Lower California, beginning near San Quentin. About 20 miles of rails and rolling stock for construction purposes will soon arrive from England. The grading is to be commenced at once at San Quentin. The work is of a fairly light nature, and with few large bridges, the maximum grades being 106 ft. to the mile, and the maximum curves of 600 ft. radius. The concession for this railroad was transferred to the present company by the Mexican Land & Colonization Co. The concession is for a road from San Quentin to the Colorado River near Yuma, Arizona, and from Tia Juana south of San Diego, Cal., and near the United States boundary, southeast to the Trinidad Valley, and from Trinidad southwest to San Quentin. The line is about 250 miles long. The preliminary and locating surveys are being made by R. A. Graham, of San Diego, who also has the contract for completing the first 50 miles of the lower end of the line. The line runs from Tia Juana to Alamo through a rich mining country, thence through the Trinidad Pass to Colonett, where the San Rafael River is crossed; turning south from that place a rich mesa land is traversed until San Quentin is reached. W. Z. Earle, of San Diego, is Chief Engineer.

Perry County.—The contracts for the grading on the proposed extension from New Bloomfield to Loysville and Landisburg will probably be awarded early next week. The line is about 12 miles long, and will pass through an agricultural country and also reach iron mines. Connection will be made with the main line of the Pennsylvania at Duncannon.

Port Arthur, Duluth & Western.—The contractors have completed the grading from Stanley to near the head of Whitefish Lake, Ont., near the Minneosta State line. The track will be laid on this 20 miles as soon as two or three trestles have been built.

Potomac Valley.—The grading on this line along the Potomac River Valley from Williamsport, Md., to Cherry Run, W. Va., a distance of 10 miles, is now completed for about one-third of the distance. The contracts for the entire work have been let to Ryan & McDonald, of Baltimore. They began grading several weeks ago, and at present have about 300 men employed. The line is on the north side of the Potomac River, near the Chesapeake & Ohio Canal, and the work is quite heavy for the entire distance. There are two important bridges, one across the Conococheague Creek, at Williamsport, and one across the Potomac River, at Cherry Run, where connection is made with the Baltimore & Ohio. Bridges will also be built across the Chesapeake & Ohio Canal and one across the Little Conococheague. Besides this work there are about a dozen trestles.

Rapid City, Missouri River & St. Paul.—Bids for grading the first 42 miles of the road east of Rapid City, S. D., will be received until July 30. This will bring the road to the Cheyenne River, beyond which only preliminary surveys have been made.

Richmond & Danville.—The Murphy Branch, which was recently completed to Murphy, N. C., 217 miles southwest of Asheville, has been opened for through traffic from Asheville to Atlanta, connection being made at Murphy with the Marietta & North Georgia, which is completed to Marietta, 20 miles north of Atlanta.

Roxborough.—The company was incorporated in Pennsylvania last week to build a suburban line at Philadelphia. The road is to extend from a point near the intersection of Chelton avenue and Pulaski avenue, in the Twenty-second Ward of Philadelphia, to Plymouth, in Montgomery County, Pa., a distance of about 10 miles. The capital stock is $100,000. William T. Dixon, Philadelphia, is President.

San Antonio & Aransas Pass.—The Waco branch of this line, which has just been extended northward from Lexington to Rockdale, Tex., 17 miles, was opened for business to the latter point on July 22. New stations have been established on this extension at Niles, 94.2 miles from Yoakum, and Rockdale, 102.5 miles from Yoakum.

San Joaquin Valley.—The grading has been in progress near Fresno, Cal, with a large force, for about two weeks, beginning at the track of the Southern Pacific in that town. The contractors are Fitzgerald Bros., of Oakland, Cal., who have the grading on the first 23 miles from Fresno. The route from Fresno is in a northeasterly direction, crossing the San Joaquin River at Hamptonville and into the Sierra Nevada Mountains. The survey has been completed for about 50 miles and is still in progress. North of Hamptonville the survey keeps back of the river about six to 10 miles, thence working to the river again about 70 miles from Fresno. The section now under contract is easy earthwork on the plains; beyond it there is hill work, and there is also about 25 miles of mountain work on the northern part of the line. Several branches will be built for timber traffic, aggregating 35 miles. The bridge across the San Joaquin River will be the most important one, but several other smaller bridges will be necessary.

Sedalia, Springfield, Marshall & Northern.—The engineers have completed their preliminary surveys for about 90 miles north of Springfield toward Sedalia. They are now working near Lincoln above Warsaw in Benton County, and 20 miles south of Sedalia. The survey north of Sedalia will be run first to Marshall, 30 miles, and thence to Miami.

Suwannee River.—The company is to change its line south of Ellaville, Fla., so as to run through the new phosphate mines opened in northwestern Florida. Five miles of new track will be built and probably about 13 miles of the present track will be changed.

Texas, Louisiana & Eastern.—The grading has begun on this road near Conroe, Tex., and is now progressing rapidly, the contractors having a large force at work.

Clay & Young, of Clay, Tex., have the contract for grading the first section. The preliminary surveys have been made from Conroe easterly to a point on the Trinity River in Liberty County about 40 miles from Conroe. The line has been located for 12 miles from Conroe; north of east for two miles, and then directly east for 10 miles. The engineers expect to have 20 miles of the road completed in September. The work is moderately heavy for this distance. The next 12 or 14 miles will be light work and the balance heavy. The maximum grade is 52 ft. per mile and the maximum curvature three degrees. The bridge across the Trinity River will probably be the only iron bridge, but there will be some long pile trestles.

The Dalles, Dufur & Silkstone.—The preliminary surveys have been completed on about 150 miles southwest of the Columbia River, from The Dalles, Or., to Tygh Valley and thence to the Silkstone mines, near the Cascade Mountains, about 200 miles. The grading will be light, but there will be a tunnel about 2,200 ft. long, and a bridge across the DeChutes River. It is stated that the contract for grading will be let in August. George A. Liebe is President and R. H. Norton is Chief Engineer.

Toledo & Chicago Bee Line.—E. J. Reynolds & Co. have the contract for the grading from Toledo, through Goshen and Laporte, Ind., to Chicago, about 225 miles. They state that the first 130 miles to Goshen will be sublet at once and that it is the intention of the projectors to have part of the line in operation next January. The road was surveyed last fall by Hosea Paul, of Toledo, for the Toledo & Western, of which G. G. Hadley, of 305 Summit street, Toledo, was President. These officers, with those of the new company, are now going over the route.

Western New York & Pennsylvania.—The change in the location of the Swains branch between Swains and Nunda Junction, N. Y., will probably be completed this week. The ballasting will then be commenced and the new line will shortly be ready for operation. The change of line now in progress is 4.85 miles in length. The present line crosses the Erie road and parallels that line on the south side for the distance above given to Swains. The change abandons the crossing of the Erie and parallels the line on the north side to the same point. The contract for this work has been let to A. C. Barron, of Rochester. The character of the work is very light; here are no bridges, no additional mileage, and no change in stations.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The directors have declared a dividend of two per cent. on the income bonds out of the earnings of the company for the fiscal year ending June 30. The operation of the road for the year, after deducting the fixed charges, leaves a surplus of $2,531,000.

Baltimore & Ohio.—Below is a statement of the earnings for June and the nine months of the fiscal year of the lines east and west of the Ohio River:

Month of June.	1891.	1890.	Inc. or dec.
Gross earnings	$1,971,550	$1,916,364	I. $55,186
Operating expenses	1,448,415	1,474,047	D. 25,622
Net earnings	$523,135	$442,317	I. $80,818
Since Oct. 1.			
Gross earnings	$17,588,159	$17,865,473	D. $277,314
Operating expenses	12,536,544	12,686,680	D. 150,136
Net earnings	$5,051,615	$5,178,793	D. $127,178

Cincinnati, Hamilton & Dayton.—The standard gauging on the Cincinnati, Dayton & Chicago between Dayton and Delphos, O., was completed July 13. The changing of the rails was commenced Saturday evening, July 11, and was completed Monday night. The traffic on the road has been very light, and no effort was made to accomplish the widening of the gauge in any specially short time. The line is 95 miles in length, and will hereafter be operated as a proprietary line of the Cincinnati, Hamilton & Dayton. It was originally part of the Toledo, Cincinnati & St. Louis and afterward of the Dayton, Fort Wayne & Chicago. It is now controlled by the above company through ownership of stock.

Covington, Felingsburg & Ashland.—The Cincinnati & Southeastern, which was sold at foreclosure sale last February to the Columbus Steel Co., has been reorganized under the above name. It is a 17-mile road, from Johnson to Hillsboro, Ky.

Fort Scott Central.—This company was formed at Fort Scott, Kan., July 21 by the consolidation of three lines which were incorporated in October, 1889, to build branches of the Missouri Pacific. These are the Fort Scott & Eastern, projected from Fort Scott northeast to Tipton, Mo., 125 miles, and built to Rich Hill, Mo., 26 miles; the Fort Scott Terminal, and the Fort Scott & Southern, which is to build from Fort Scott south to Minden, Mo., 30 miles.

Illinois Central.—The net earnings for the 12 months ending June 30, 1891, and 1890 (June, 1891, estimated), were as follows:

	1891.	1890.	Inc. or dec.
Miles operated	2,875	2,875	
Gross earnings	$17,712,148	$16,452,022	I. $1,260,126
Oper. expen and taxes	12,778,326	11,168,395	I. 1,609,931
Net earnings	$4,933,882	$5,283,627	D. $349,805

From the net earnings of the year ending June 30, 1891, a further dividend of two per cent. has been declared, which, with the dividend paid March 1, makes five per cent. for the year.

Northern Pacific.—The following were the gross earnings of this road for the year, June being estimated:

	N. Pacific.	W. Cen.
1890-1891	$25,106,112	$1,819,187
1889-1890	22,610,502	4,383,320
Increase	$2,495,610	$435,867

The gross earnings of both companies for May, 1891, were $2,293,476, an increase of $973,123. The proportion of fixed charges was $1,033,530, leaving a total surplus for ten months, applicable to dividends, of $1,620,305.

Pennsylvania.—The report of the earnings of all lines east of Pittsburg and Erie for June, 1891, as compared with the same month in 1890, shows an increase in gross earnings of $268,651, a decrease in expenses of $31,820, and an increase in net earnings of $300,471. The six months of 1891, as compared with the same period of 1890, show a decrease in gross earnings of $483,100, a decrease in expenses of $514,935, and an increase in net earnings of $31,835. All lines west of Pittsburg and Erie for June, 1891, as compared with the same month in 1890, show an increase in gross earnings of $66,417, a decrease in expenses of $109,000, and an increase in net earnings of $175,417. The six months of 1891, as compared with the same period of 1890, show a decrease in gross earnings of $1,192,528, a decrease in expenses of $1,402,488, and an increase in net earnings of $209,960.

Philadelphia & Sea Shore.—Application was made this week to Chancellor McGill, at Jersey City, for the appointment of a Receiver for the road which extends from Winslow Junction through Tuckahoe to Cape May City, N. J. The application was made by Samuel H. Gray, of Camden, and John R. Emory, of Newark.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The statement of the business of the company, including the Little Miami road, for June, 1891, as compared with the same month in 1890, shows an increase in gross earnings of $5,185, a decrease in expenses of $73,191, and an increase in net earnings of $78,377. The six months of 1891, as compared with the same period of 1890, show a decrease in gross earnings of $536,432, a decrease in expenses of $542,135, and an increase in net earnings of $5,702.

Union Pacific.—The earnings of the entire system and several of the operated lines for May are given below:

WHOLE SYSTEM.

Month of May.	1891.	1890.	Inc. or dec.
Mileage	8,144	8,034	I. 110
Gross earnings	$3,419,426	$4,167,540	D. $748,115
Operating expenses	2,392,078	2,839,459	D. 447,373
Net earnings	$1,027,348	$1,328,090	D. $300,742
Mail earnings	141,363	443,045	D. 301,742
Jan. 1 to May 31.			
Gross earnings	$15,912 623	$16,865,857	D. $893.234
Operating expenses	11,257,524	12,286,526	D. 1,029,002
Net earnings	$4,655,099	$4,519,341	I. $1 5,768

OREGON SHORT LINE & UTAH NORTHERN.

Month of May.			
Mileage	1,422	1,399	I. 23
Gross earnings	$616,766	$767,526	D. $150,760
Operating expenses	441,057	474,290	D. 33,233
Net earnings	$175,709	$293,236	D. $117.527
Mail earnings	24,447	87,240	D. 62,793
Jan. 1 to May 31.			
Gross earnings	$3,039,785	$2,852,048	I. $187,737
Operating expenses	1,916,100	1 990,961	D. 74,861
Net earnings	$1,123,685	$861,087	I. $262,598

UNION PACIFIC, DENVER & GULF.

Month of May.			
Mileage	1,461	1,386	I. 66
Gross earnings	$474,463	$513,535	D. $39,072
Operating expenses	336,302	352,189	D. 15,887
Net earnings	$138,161	$161,346	D. $23,185
Since Jan. 1:			
Gross earnings	$2,011,966	$2,115,103	D. $103,137
Operating expenses	1,638,398	1,512.781	I. 125,617
Net earnings	$373,568	$602,322	D $228,754

The company explains that the decrease in earnings is in part due to the fact that certain sums claimed for fast-mail services rendered for the United States between November, 1889, and May, 1890, were included in the revenue accounts for May, 1890. The claims, not having been allowed by the United States, have since been deducted from the revenue accounts of succeeding months, but without prejudice to the company's claims.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, July 22, 1891.

The Western Passenger Association has finally fixed the excursion rate to the encampment of the Grand Army of the Republic at Detroit, at one fare for the round trip, by all routes. This leaves the Alton out in the cold, and it will probably make a round-trip rate of one fare from St. Louis and Kansas City to Chicago. Final decision in regard to running harvest excursions has been deferred until action has been taken by the Trans-Missouri Passenger Association.

The "Monon" has yielded to the pressure brought to bear upon it by the other roads, and has agreed to withdraw its tickets from the hotel offices.

The Western Passenger Association having agreed upon special rates for a number of fairs and other gatherings, Mr. Charlton, of the Alton, writes Mr. Finley as follows: "In all cases in which you take action without permitting us to have a voice in the decision we must decline to be bound by your action. We do not purpose acting independently of our competitors, but that involves that our competitors shall not act independently of us. We do not intend that you or your Association shall dictate to us."

The Central Traffic Association Freight Committee at its meeting last week referred the proposed "legal division of traffic" to the managers, having decided that the traffic officers did not have the authority to perfect the plan. Authority was given all lines to receive watermelons l. c. l., without requiring them to be packed. Corn feed was added to the list of articles authorized as products of grain. The minimum weight of green vegetables, c. l., n. o. s., was fixed at 20,000 lbs. A committee was appointed to confer with the Ohio River Traffic Association with a view to agreeing upon a uniform switching charge by all lines for building material for the World's Fair. The co-operation of the Central Traffic lines was tendered the Southern lines toward an advance and maintenance of cotton rates from Mississippi Valley territory.

The committee of the Western Passenger Association have ordered the diversion of all westbound emigrant travel handled by Johnson & Co. to the Chicago, Burlington & Northern until further notice. The last order divided it between that road and Rock Island.

It is reported that the Soo line proposes to take a differential of $3 on eastbound passenger rates from St. Paul.

A cut is reported in eastbound passenger rates of from $2 to $3 via the Grand Trunk and Wabash. Canadian Pacific and Boston & Maine by the placing of a block of split tickets in the hands of scalpers here.

Wool rates to Boston have been reduced from 58 to 42 cents by lake and rail lines to meet the 55-cent rate of the Soo line from St. Paul.

Lake rates on grain eastbound are quoted firm at 2 cents on wheat and 1½ on corn to Buffalo; 3½ for corn to Ogdensburg; 1½ for corn to Georgian Bay. A heavy increase in receipts holds rates firm, although the short shippers have generally secured tonnage. Offerings of ore tonnage at Cleveland are light and the demand good; rates strong at $1 from Ashland and Two Harbors, 95 cents from Marquette and 70 cents from Escanaba.

C. N. Mitchell, the employé of Mulford's arrested on a charge of embezzlement preferred by C. N. Johnson, a detective employed to test the market by the Western Passenger Association, as noted in my letter last week, had his preliminary trial before Justice Lyon, July 17, and was held for the Garnd Jury in bonds of $300. It turns out that the brokers were anxious to have suit brought in order that they might have a chance to examine Chairman Finley and other Association officials whom they have for a long time been desirous of asking a few questions, but the detective agency was too smart for them and Johnson preferred a charge of embezzlement instead of instituting a civil suit, and Justice Lyon held that the brokers could not examine the witnesses subpœnaed.

Traffic Notes.

The wholesale grocers of interior Kansas cities are again complaining that the railroads discriminate against them in sugar rates, and have laid a case before the State Railroad Commissioners.

The railroads centring at Montgomery, Ala., have formed a car service association there. In connection with this and the Birmingham association they will probably organize a State association.

On Aug. 23 the law goes into effect in Arkansas which requires a separate car instead of a separate compartment for negroes. Only about four per cent. of the passenger travel in Arkansas is made up of negroes, and the new law will prove a burden on some lines.

The Texas Railroad Commissioners have ruled that railroads may carry freight for the State or any city or town government or for charitable purposes or to fairs and exhibitions free or at reduced rates. Churches are declared not objects of charity under the purview of the commission law.

Senator Chandler, of New Hampshire, has published an open letter in his paper, the *Concord Evening Monitor*, addressed to the Interstate Commerce Commission, in which he complains against the Boston & Maine for extensively issuing free passes in violation of law, and asking for an investigation of his charges. It appears that the charge is based on a letter from the road revoking a pass that had been issued to a newspaper, the conduct of the paper in criticising the road being the cause alleged for terminating the advertising contract on which the pass was issued. The Commission has notified the road to answer by Aug. 5.

A Rochester (N. Y.) reporter, who has been hunting for mares' nests, discovers that the law of New York State forbids "a patentee" who runs his sleeping car on a railroad to charge more than 80 cents per 100 miles for a berth. The law went into effect May 1 of this year, and the newspapers have published columns about the reporter's discovery and the lawlessness of the railroads and sleeping-car companies. But the excitement subsided when it was discovered that the law was simply a reprint, made by the revisers, of one which has been on the books since 1858, and which has always been a dead letter. Evidently most of our sleeping cars are run by other men than the "patentees."

Southeastern Mississippi Valley Association.

The above named Association has been formed by the Alabama, Great Southern; Louisville & Nashville; Mobile & Ohio; Newport News & Mississippi Valley; Cincinnati, New Orleans & Texas Pacific; Kansas City, Memphis & Birmingham; Louisville, New Orleans & Texas; Memphis & Charleston; Nashville, Chattanooga & St. Louis; Ohio Valley and Richmond & Danville roads.

The traffic of the following territory is subject to the rules and regulations of the Association: From, to or through Ohio and Mississippi River points between Cincinnati, Cairo and New Orleans, inclusive, and junction of crossing points south of Ohio and east of the Mississippi rivers, which traffic has its origin or destination on or east of the Mississippi River, and on or south of the Ohio River and south of the Virginias; and all competitive traffic originating at or destined to junction or crossing points within the territory described. Traffic between points on the Ohio and Mississippi rivers or between points on the Ohio and Mississippi rivers and outside of the described territory, shall not be subject to this agreement. The local traffic of any line a member of the Association will not be subject to the agreement. E. W. Howe, Traffic Manager of the Louisville, New Orleans & Texas, has been appointed commissioner to act until a permanent commissioner is appointed, and Jefferson Murray, of St. Louis, Secretary, with headquarters at Memphis.

The Cumberland Gap Despatch.

This is the name of a fast freight line which has been formed by the following steamship lines and railroads: The Merchants & Miners' Transportation Co., the Old Dominion Steamship Co., the Clyde Steamship Co., the Baltimore Steam Packet Co., the Norfolk & Western, the Louisville & Nashville, the Louisville, Evansville & St. Louis Consolidated, the Peoria, Decatur & Evansville, the Evansville & Terre Haute, and the Louisville, St. Louis & Texas railroads. Thomas Pinckney is the General Eastern Agent, with headquarters at New York City.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending July 16 amounted to 45,553 tons, against 54,359 tons during the preceding week, an decrease of 8,806 tons. The proportions carried by each road were:

	Wk. to July 16.		Wk. to July 9.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	5,807	12.8	2,716	10.5
Wabash	3,335	7.3	3,759	6.9
Lake Shore & Michigan South.	5,919	13.0	8,174	15.0
Pitts., Ft. Wayne & Chicago	6,050	13.3	5,437	10.0
Pitts., Cin., Chicago & St. L	5,497	12.1	5,819	10.7
Baltimore & Ohio	3,384	7.4	3,654	6.7
Chicago & Grand Trunk	3,640	8.0	5,638	10.4
New York, Chic. & St. Louis	4,570	10.0	6,031	11.1
Chicago & Erie	7,351	16.1	10,131	18.7
Total	45,553	100.0	54,359	100.0

Of the above shipments, 1,794 tons were flour, 12,546 tons grain, 1,824 tons millstuff, 5,618 tons cured meats, 8,175 tons dressed beef, 2,418 tons butter, 1,603 tons hides, 472 tons wool and 6,844 tons lumber. The three Vanderbilt lines together carried 35.8 per cent., while the two Pennsylania lines carried but 25.4 per cent. The lake lines carried 79,454 tons, against 84,700 tons during the preceding week, a decrease of 5,246 tons.